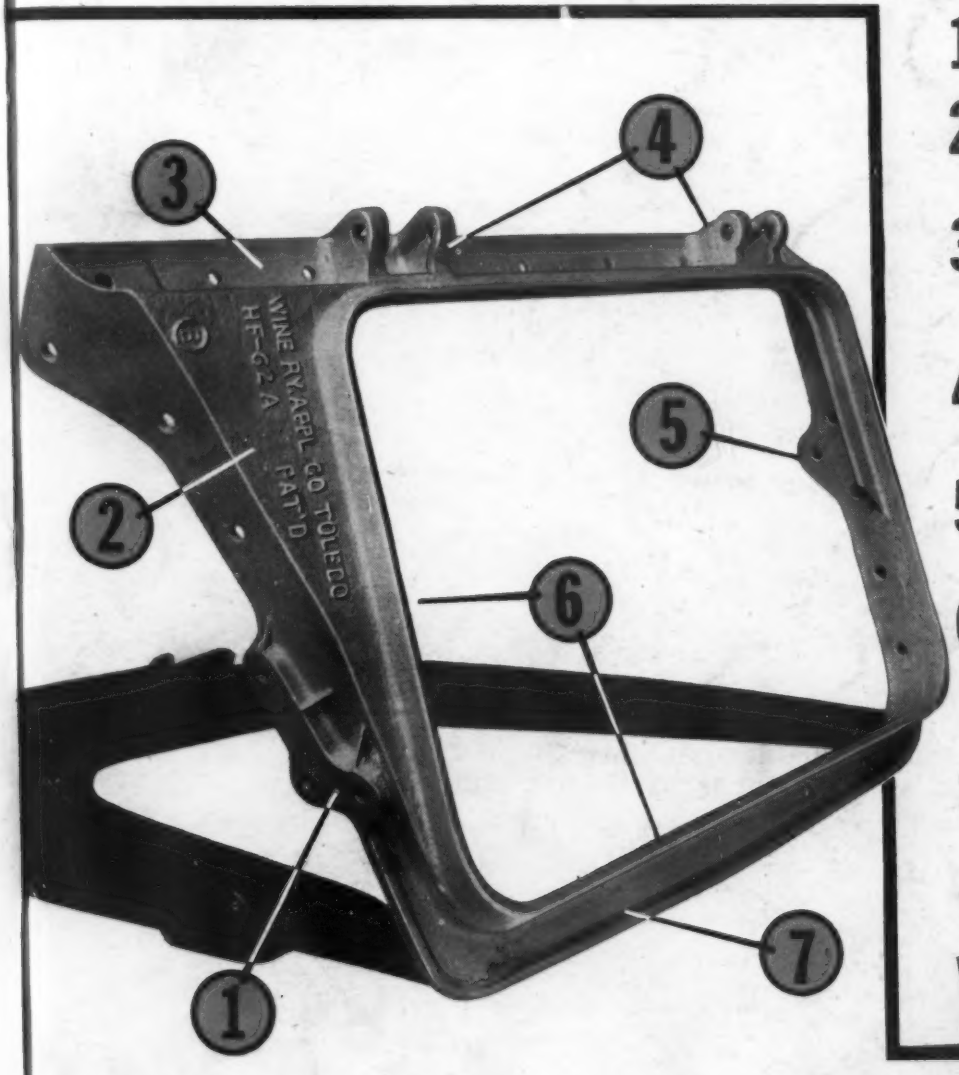
Railway Mechanical Engineer

January 1945

ENGINEERED...

... for your car designs



1 ACCURATELY LOCATED BASE FOR WINE DOOR LOCKS

2 GUSSET—AT SIDE OF DOOR OPENING ASSURES TRANSVERSE RIGIDITY

3 STURDY TOP SECTION—ASSURES AMPLE SUPPORT FOR THE CROSSRIDGE SHEETS AND PROTECTS TOP EDGE OF DOOR

4 HINGE LUGS CAST INTEGRAL WITH FRAME—PREVENT FAULTY HANGING OF DOORS

5 CENTER SILL ATTACHMENT PREVENTS SPREADING AND SAGGING OF HOPPERS

6 INTEGRAL CAST RIMS PROVIDE A RIGID, UNIFORM DOOR FIT—ENTIRELY SURROUNDING THE HOPPER OPENING—THUS ELIMINATING LOSS OF LADING

7 STURDY BOTTOM SECTION PREVENTS SAGGING FLOORS

CAST STEEL HOPPER FRAMES

RAILWAY APPLIANCES
TOLEDO 9, OHIO

Published monthly by Simmons-Boardman Publishing Corporation, 1309 Noble Street, Philadelphia, Pa. Entered as second-class matter, April 3, 1933, at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription price, $3.00 for one year, U. S. and Canada. Single copies, 35 cents. Vol. 119, No. 1.

In Your Electro-Plating Department Assures BETTER Plated FINISHES

FOR removing oil, grease, smut, coloring and buffing compounds and other deposits from lock and key work, screws, signal contact parts, silverware and other items, specially designed Oakite materials quickly give you the CHEMICALLY CLEAN surfaces so essential for durable, long-wearing plate adhesion.

Free Booklets for Plating Department Supervisors

VARIOUS Oakite booklets dealing with practically every phase of cleaning and surface preparation on a wide range of metals and alloys prior to the application of chemical, organic or plated finishes are readily available to Plating Department Supervisors. Free for the asking, they will be promptly mailed to you on request. Write today for your copies.

"KEEP POWER ROLLING"

ASK US ABOUT

Cleaning Air Conditioning Equipment

★

Pressure Cleaning Valve Gear

★

Cleaning Crossheads, Bearings, Journal Boxes, Brake Shoes, Etc.

★

Safely Washing Streamliners

★

Preparing Locomotive Frames For Fracture Tests

★

Back Shop Tank Cleaning

★

Safely De-scaling Diesel Cooling Systems, Oil Coolers, Etc.

OAKITE PRODUCTS, INC., WRIGLEY BUILDING, CHICAGO 11, ILL.

In Canada: OAKITE PRODUCTS OF CANADA, LTD.
TORONTO: 65 Front St. East—MONTREAL. 1 Van Horne Ave.

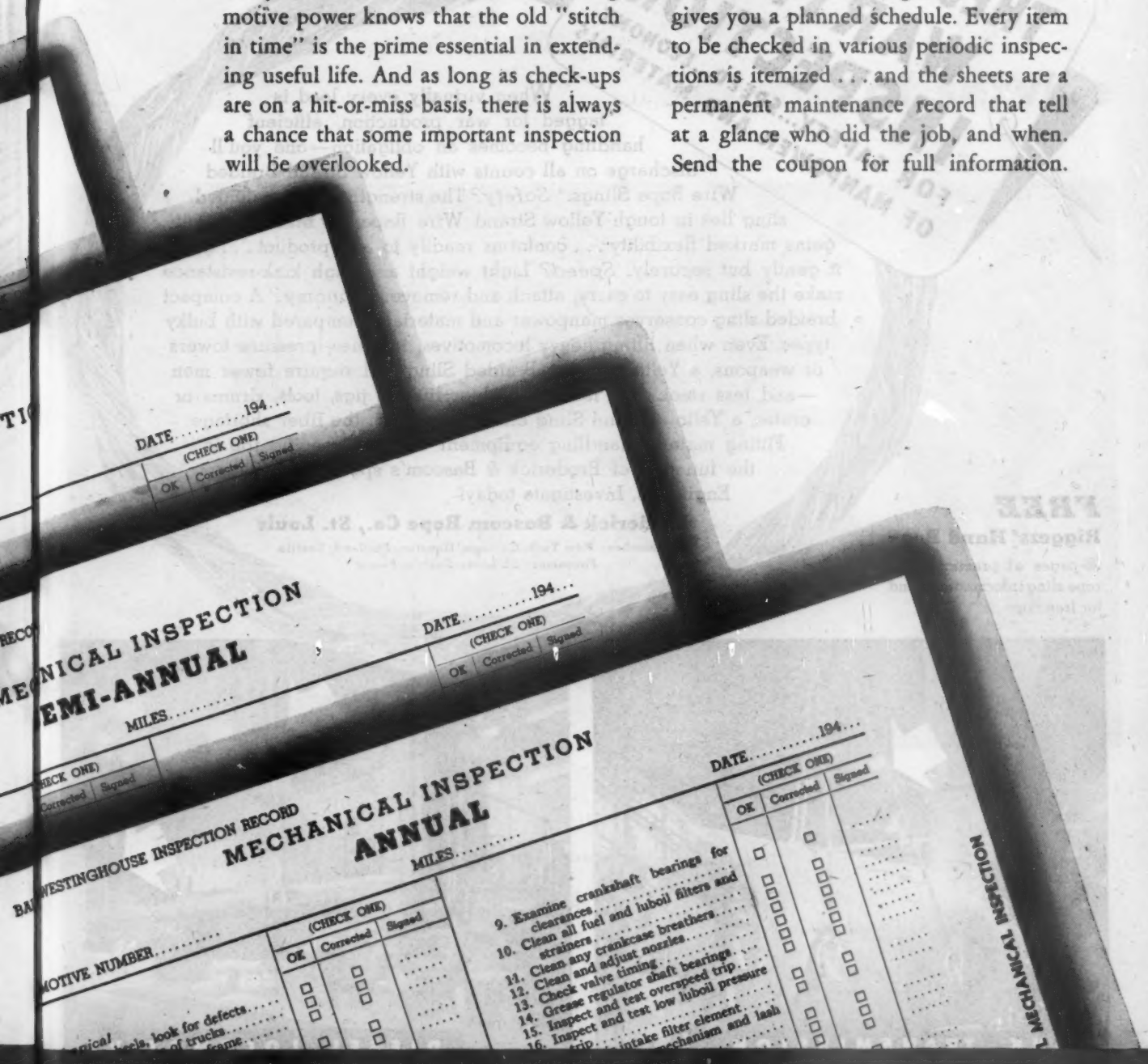
OAKITE

RAILWAY SERVICE DIVISION

Fighting Trim is up to you!

Every man concerned with maintaining motive power knows that the old "stitch in time" is the prime essential in extending useful life. And as long as check-ups are on a hit-or-miss basis, there is always a chance that some important inspection will be overlooked.

The Baldwin-Westinghouse "Guide" gives you a planned schedule. Every item to be checked in various periodic inspections is itemized . . . and the sheets are a permanent maintenance record that tell at a glance who did the job, and when. Send the coupon for full information.



Westinghouse

LOCOMOTIVES

THE BALDWIN LOCOMOTIVE WORKS
Advertising Department
Paschall P. O., Phila. 42, Pa.

Please send information on your inspection and maintenance checking system.

NAME_____

TITLE_____

COMPANY_____

ADDRESS_____

THESE SLINGS PASS WARTIME INSPECTION

FOR SAFETY...SPEED...ECONOMY OF MANPOWER AND MATERIALS

When virtually every load is tagged for war production, efficient handling becomes an obligation—one you'll discharge on all counts with Yellow Strand Braided Wire Rope Slings.* *Safety?* The strength of this patented sling lies in tough Yellow Strand Wire Rope, so braided that it gains marked flexibility . . . conforms readily to any product . . . grips it gently but securely. *Speed?* Light weight and high kink-resistance make the sling easy to carry, attach and remove. *Economy?* A compact braided sling conserves manpower and materials, compared with bulky types. Even when lifting heavy locomotives, turbines, pressure towers or weapons, a Yellow Strand Braided Sling will require fewer men —and less steel. And for such lighter lifts as jigs, tools, drums or crates, a Yellow Strand Sling offers relief from the fiber shortage. Fitting material-handling equipment to your specific job is the function of Broderick & Bascom's specialized Sling Engineers. Investigate today!

Broderick & Bascom Rope Co., St. Louis

Branches: New York, Chicago, Houston, Portland, Seattle
Factories: St. Louis, Seattle, Peoria

FREE
Riggers' Hand Book
96-pages of practical wire rope sling information. Send for free copy.

TANK TRANSMISSION

DIESEL LOCOMOTIVE

*Patents: U. S., 1475830, 1524671, 2142641, 2142642, 2289568, • Canadian, 252874, 258068

BRODERICK & BASCOM

YELLOW STRAND

Braided Wire Rope SAFETY SLINGS

Lost

...after only 6 months of service

This car is but six months old, yet common nuts used for fastening intermediate, floor nailing stringers are loose or missing . . . a condition that becomes increasingly damaging.

Had "M-F" Speed Nuts been used here, they would still be on the job . . . they will remain in position for the life of the car and maintain their locked position regardless of shrinkage of timbers or the shock of service.

"M-F" Speed Nuts are insurance against damage caused by missing nuts.

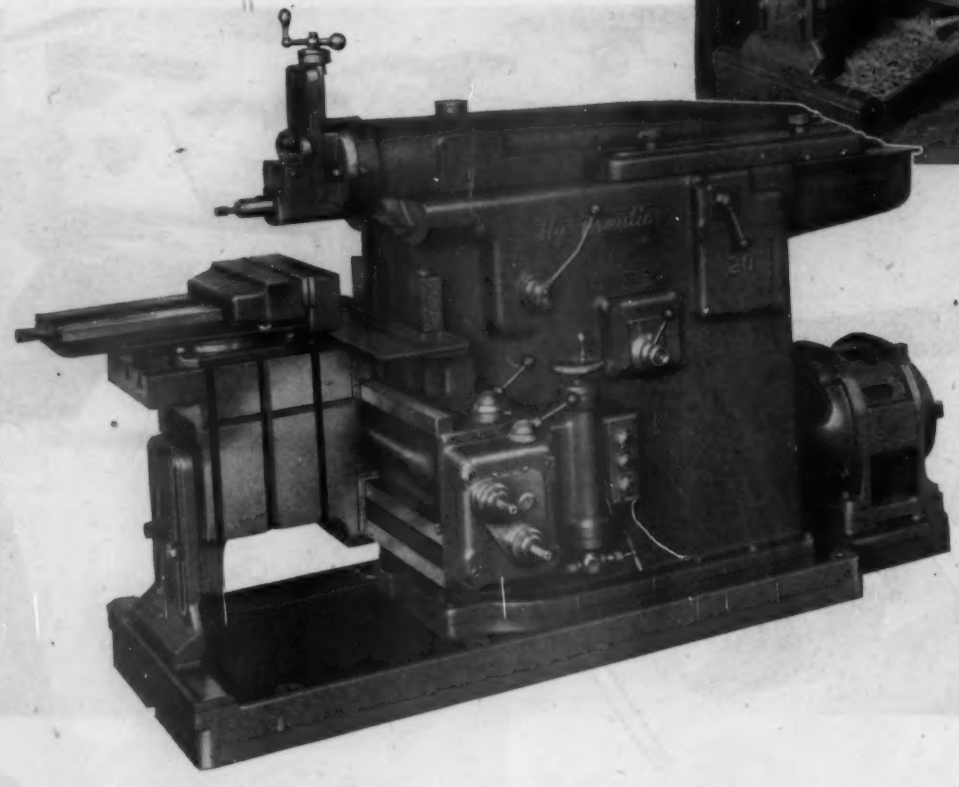
"M-F" Speed Nuts require no extra operations . . . no other nuts.

MAC LEAN-FOGG LOCK NUT COMPANY

2649 N. Kildare Avenue, Chicago 39, Illinois • ***In Canada: The Holden Co., Ltd., Montreal***

You Couldn't Beat that Baby"

SAID PAUL AT S & B TOOL CO.



BUY UNITED STATES WAR BONDS AND STAMPS

The "baby" is one of the Hy-Draulic Shapers in the plant of the S & B Tool Co. where Paul is foreman. By way of proof, Paul put the Hy-Draulic Shaper through its paces for the visitors and their camera. Easy set up was demonstrated by use of centralized controls, rapid traverses; quick, easy establishment of desired cutting speed and feed, setting ram-stroke length and position in one simple manual operation with hardly a pause in its movement. In less time than it takes to describe, chips rolled off the job and Paul stood at ease ready for the next operation. In shops like this, where fine work is put out around the clock seven days a week steadily month after month, the easy, fast operation, accuracy and stamina of Hy-Draulic Shapers pay off in high production and economy of effort. For present and future tool and die work, maintenance or production operations that include shaping — buy Hy-Draulic Shapers. Write to us today, for Bulletin 1915.

4411

ROCKFORD MACHINE TOOL CO., ROCKFORD, ILLINOIS

Improved Rotary Shear Speeds Production

Does the work of many machines

This new Rotary Shear cuts quickly, easily and economically . . . with hair line accuracy and without burr edges. It has a capacity of mild steel plates up to 1" thickness, and alloy plates in proportion to their hardness. Illustrated is the No. 250 machine. However, both larger and smaller machines are also available. Easily installed attachments permit a wide variety of work to be performed.

TEN IMPORTANT FUNCTIONS

1. Straight line cuts
2. Joggles and offsets
3. Bevels at any angle
4. Rolls flanges
5. Beads and U's
6. Cuts circles
7. Shears odd shapes
8. Cuts reverse curves
9. Large or small rings
10. Cuts inside holes

Ryerson Railroad Shop Machinery and Tools

In addition to the Rotary Shear, Ryerson offers a complete line of metal-working machinery and tools for railroad shops. This line of equipment includes special machines for sawing, punching, bending, rolling, drilling, forming, lifting, threading, friction sawing, and many others. Spring shops will find many items particularly well suited to their work. There are also machines for cutting, scale removing, and butt welding of safe-ends for locomotive flue shops.

A handy, pocket-size catalog illustrates and gives the specifications for hundreds of these helpful machines and tools. Let this serve as your guide in the purchase of metal-working equipment of all kinds. Write for your copy today.

Joseph T. Ryerson & Son, Inc. Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

RYERSON

GENERAL SPECIFICATIONS

	STANDARD SWITCHERS		ROAD SWITCHER
Starting tractive effort (at 30% adhesion)	88,000 lb	59,700 lb	88,000 lb
Engine, one, 8-cyl	Supercharged 1000 hp	660 hp	Supercharged 1000 hp
Driving Motors	4	4	4
Maximum speed restriction	60 mph	60 mph	60 mph
Driving wheels (number)	4 pairs	4 pairs	4 pairs
(diameter)	40 in.	40 in.	40 in.
Weight on drivers, fully loaded	230,000 lb	199,000 lb	230,000 lb
Wheelbase, each truck (rigid)	8 ft 0 in.	8 ft 0 in.	9 ft 4 in.
Locomotive truck centers	30 ft 6 in.	30 ft 0 in.	40 ft 6 in.
Over-all locomotive dimensions			
Height	14 ft 6 in.	14 ft 4 in.	14 ft 6 in.
Width	10 ft 0 in.	10 ft 0 in.	10 ft 0 in.
Length (inside knuckles)	45 ft 5¾ in.	44 ft 5¾ in.	54 ft 11¾ in.
Minimum radius curvature (locomotive alone)	50 ft 0 in.	50 ft 0 in.	100 ft 0 in.
Supplies (total capacity)			
Lubricating oil	80 gal	80 gal	80 gal
Fuel oil	635 gal	635 gal	1800 gal*
Engine-cooling water	240 gal	220 gal	240 gal
Sand	27 cu ft	27 cu ft	27 cu ft

* If boiler is applied
Boiler-water tank.....800 gal
Fuel-oil tank.....800 gal

More than 500 of these 1000-hp Alco-G.E. units are speeding train movements through yards and terminals. Three of them in a midwestern yard are typical. They are averaging 40,000 locomotive-hours between overhauls.

The versatility of our 1000-hp road switcher permits full utilization of its 95 per-cent average availability. It can handle the entire motive-power job — switching, accumulating trains, and hauling them on the road.

A study of 30 of these 660-hp units that have been in operation for more than three years on 10 railroads shows the following average costs per locomotive-hour: maintenance, 24 cents; fuel, 30 cents; and engine house expense, 5 cents.

Alco-G.E. diesel-electrics slash steamer switching costs as much as 50%.

Exclusive features insure long, profitable operating life.

OPERATING records show the substantial savings that Alco-G.E. diesel-electric locomotives are producing while handling some of the heaviest wartime switching assignments.

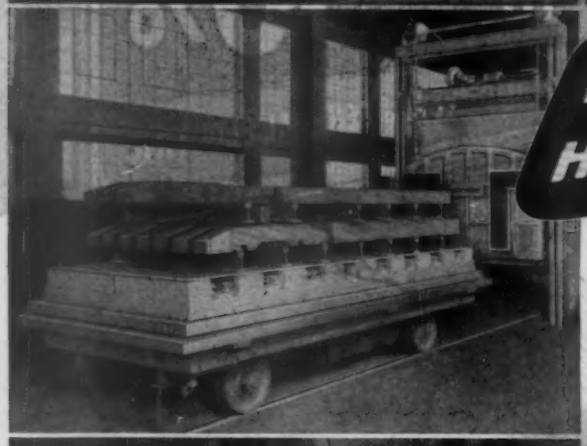
On an eastern road, for example, where seven of these units are furnishing as many locomotive-hours as was possible with 11 steamers—their operating cost, per locomotive-hour, is less than half that of the steamers.

And in a midwestern yard, six Alco-G.E. units—30 per cent of the yard's total motive power—are handling 72 per cent of the switching assignments at one-half the maintenance cost and one-fourth the fuel cost of steamers doing the same type of work. And these savings continue long after the locomotives have paid for themselves.

Alco-G.E. diesel-electrics have many distinctive features that keep maintenance cost low throughout their long operating life. The Alco 4-cycle engine, for example, has a reversal of load which produces thorough lubrication and eliminates piston-pin trouble. Co-ordinated with this engine is the G-E constant-output electric drive which makes the engine's entire horsepower available for traction at all times. The generator is direct-connected to the engine frame to assure permanent alignment, and the motors have exceptionally rigid armatures that reduce wear on gears and pinions.

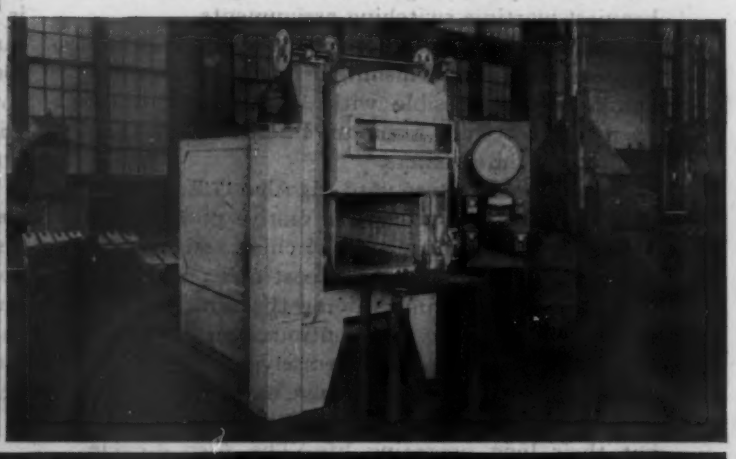
The features of Alco-G.E. diesel-electrics that assure continuous, low-cost operation are the result of our 150 years experience designing and building motive power for railroads. Because we build all three types of motive power—diesel-electric, electric, and steam—we can impartially recommend the one which will most effectively help you meet after-the-war competition.

AMERICAN LOCOMOTIVE and GENERAL ELECTRIC



POST WAR RAILROADING AND HEVI DUTY FURNACES

In the postwar type of equipment the railroads will need, metallurgy will play a vital part and precision heat treating furnaces will be an important factor in the tremendous task of rehabilitation of rolling stock. Hevi Duty furnaces have long been standard equipment in many maintenance shops because of their flexibility of use and economy of operation.—Send for your copies of descriptive bulletins.



HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES HEVI DUTY ELECTRIC EXCLUSIVELY

MILWAUKEE, WISCONSIN

LIFT ANY SIZE WITH W-S PIT JACKS

War's added loads mean many extra trips to the roundhouse. The larger, the more powerful the locomotive to be repaired, the more vital that the work be done quickly and done right.

Efficient repair yards and roundhouses have used W-S Equipment for years in the removal of driving wheels and trucks from under locomotives.

Watson-Stillman Pit Jacks are hydro-pneumatic in operation and may be furnished with hand or air operated pumps, plain ram, or with telescopic ram as in the type shown in the illustration. Both are sturdy and reliable in operation, but with the telescopic-ram jack, the cylinder is only half as long for about the same lift of the saddle. For ordinary lifts this precludes the necessity of a sub-pit and maintains a minimum height above the rails, which, of course, allows the jack to run in the shallowest possible pit.

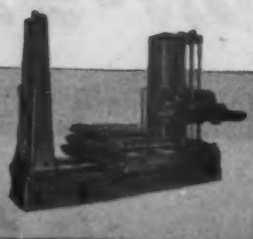
Write The Watson-Stillman Company, Roselle, N. J., for Bulletin B-8.

WATSON-STILLMAN

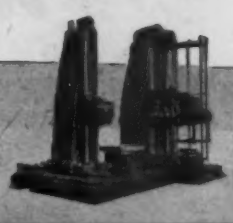
DESIGNERS AND MANUFACTURERS OF HYDRAULIC EQUIPMENT, FORGED STEEL FITTINGS, AND VALVES

GIDDINGS & LEWIS

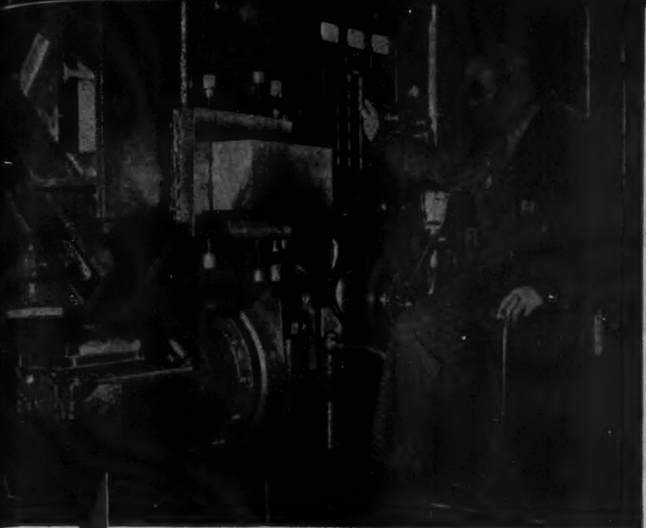
150 DOTY STREET



Right: G. & L. Table Type Machine.



Right: G. & L. Floor Type Machine.



Slab milling ends of weldment. Work and holding fixture are easily indexed on the vertical rotary table into correct machining position.

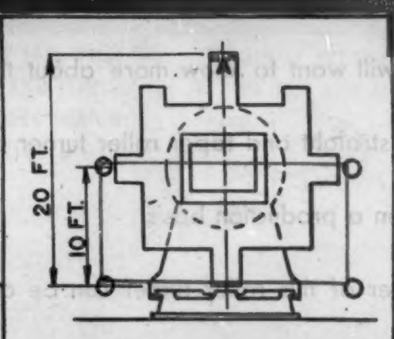
Power Driven Rotary Table Doubles Vertical Capacity of G.&L. Horizontal Boring Machine

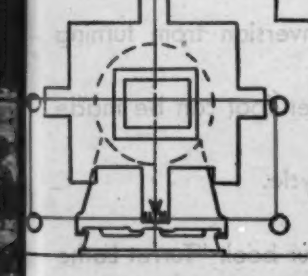
MACHINING A 20-FOOT WELDMENT... WITH 10-FOOT HEADSTOCK TRAVEL

Machining this 20-foot weldment is accomplished by using a vertical table with only 10 ft. center height and a horizontal boring machine having but 10 ft. vertical headstock travel. Work is indexed to bring the top down where it is accessible for milling and other operations. Both work rotation and tool rotation are possible. Using the power rotary table, work may be turned and faced with stationary tools much the same as on a vertical boring mill or on a lathe. Then, work can be milled, bored, drilled and tapped with tools in a rotating spindle in the conventional manner. Again work can be generated by rotating a formed tool in the boring mill spindle, while the work is turned by the rotary table.

An operator of a vertical boring mill working on a piece 20 ft. in diameter is at least 10 ft. away from the cutting tool. The operator of a floor-type horizontal boring machine, shown here, rides on a platform attached to the machine headstock and is at all times immediately adjacent to the cutting tool.

It is a simple matter to increase the range of your own horizontal by equipping it with a vertical rotary table. If you are confronted with similar machining problems, it will be profitable to call on our engineers for assistance. There is no obligation for this help.





FACE MILL—ONE SET-UP

1ST OPERATION—FACE MILL
Red frame denotes maximum working range of horizontal boring machine spindle, which is the area covered by the vertical and horizontal travel of the headstock and column.

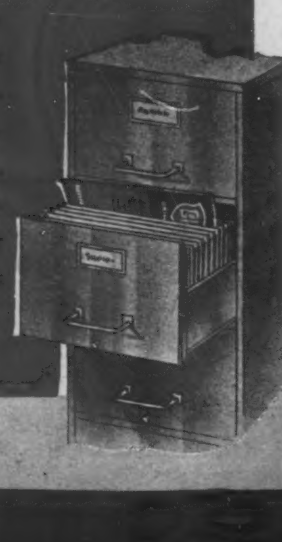
2ND OPERATION—INDEX 180°—FACE MILL
Top portion "A" has now been brought down within working range of spindle.

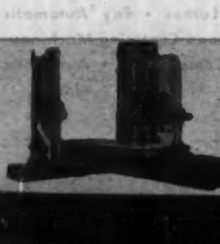
MACHINE TOOL CO.

FOND DU LAC, WIS.

Additional Data

...covering the complete line of Giddings & Lewis machines and time-saving accessories is included in this catalog. Write for your copy today—please use your business connection. Ask for Bulletin BM-13.





Left: G. & L. Planer Type Machine.

Left: G. & L. Multiple Head Type Machine.

Taper bolts

On a production basis

If you are interested in turning taper bolts faster and more accurately, you will want to know more about the productive possibilities of this combination straight and taper roller turner and our method of machining taper bolts on a production basis.

The rolls and cutter of this roller turner can be adjusted rapidly to turn any diameter from ¾ inches to 2½ inches. Conversion from turning straight diameters to turning tapers up to ¼ inch per foot can be made instantaneously at any point in the operating cycle.

Write to us for more detailed information and our book "Turret Lathe Earning Power" — your request will receive a prompt reply.

JONES & LAMSON
MACHINE COMPANY
Springfield, Vermont, U.S.A.

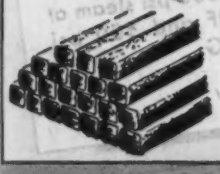
Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

FORGINGS POSSESS HIGH STRENGTH and TOUGHNESS

● Forging, or hot working metal, with closed impression dies directions the fiber structure, inherent in steel, to provide high strength and toughness where most needed to resist stress or shock. Maximum strength for a given amount of weight is just one of seven advantages that forgings offer.

These Are Other Advantages:

FORGINGS CONSERVE METAL



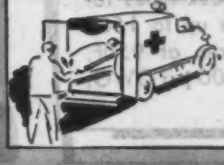
FORGINGS LESSEN SCRAP; UNUSUALLY FREE OF CONCEALED DEFECTS; PRACTICALLY NO REJECTIONS

FORGINGS REDUCE DEAD WEIGHT THROUGH MAXIMUM STRENGTH IN LIGHTER SECTIONAL THICKNESSES

FORGINGS FACILITATE RAPID ASSEMBLY THROUGH WELDING ADAPTABILITY

FORGINGS REQUIRE LESS TIME TO MACHINE AND FINISH BECAUSE SHAPED IN CLOSED DIES

FORGINGS REDUCE ACCIDENTS TO MEN AND MACHINES THROUGH A GREATER MARGIN OF SAFETY



Are you obtaining the utmost benefit from your use of forgings? A recheck of every forged part you use against these advantages may reveal unusual benefits which have been unintentionally neglected or overlooked. Even manufacturers who have had long experience in the use of forgings have found further opportunities to *reduce weight, improve product performance and effect worth-while savings* by rechecking parts against these advantages. • Consult a forging engineer connected with your source of supply. His broad experience will be helpful to you in obtaining the utmost benefit from each advantage in your use of forgings.

DROP FORGING ASSOCIATION

605 Hanna Building • Cleveland 15, Ohio

This new booklet will help you to avoid misestimating the qualities required to meet a specific service condition. Metal quality can be developed to the exact degree required by the forging process, and this booklet presents many examples that prove it. It contains 40 pages of factual information about the development of maximum strength and toughness in forgings. Over 200 illustrations are used, most of them for the purpose of showing directioned fibre structure, or grain flow as obtained by forging. This booklet has been prepared for the guidance of design engineers, metallurgists, and other technicians, production and management executives; whose task it is to determine the metal quality required for *safety and dependable performance.* Ask your source for forgings for a copy, or write direct.

Drop Forging Topics contains technical information for design engineers, production executives, metallurgists, and other technicians who specify and use metal parts for operating mechanisms. It is published ten times a year; usually contains 8 pages and is available upon request. Is your name on *Topics* mailing list?

DROP FORGING ASSOCIATION
605 Hanna Building • Cleveland, Ohio
Please send me:

☐ Booklet on "Metal Quality — How Hot Working Improves the Properties of Metal."
☐ "Drop Forging Topics," issued ten times a year

Name ..... *Position* .....
Company .....
Address ..... *City* ..... *State* .....

Please attach this coupon to your business letterhead.

End-weld Studs Automatically!

Nelson studs are end-welded to metal. No drilling holes... no welding bolts.

Used by more than 500 shipbuilding and industrial plants.

Complete fusion between stud and plate in less than ½ second!

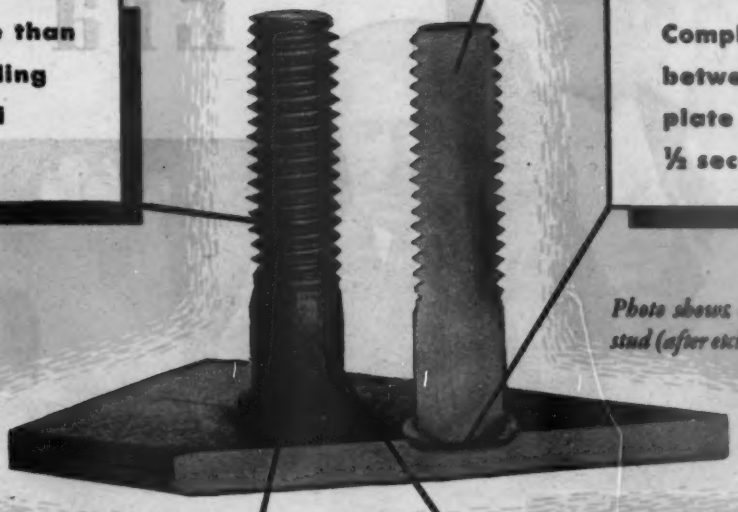
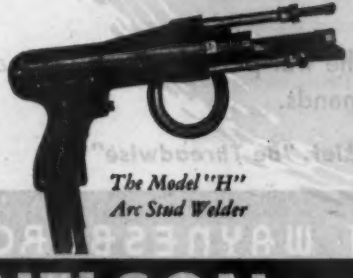


Photo shows cutaway view of stud (after etching with Nital).

Operators can weld 500 to 1000 studs a shift. Completely automatic operation.

Many diameters, lengths, and types, for securing parts of all kinds.



The Model "H" Arc Stud Welder

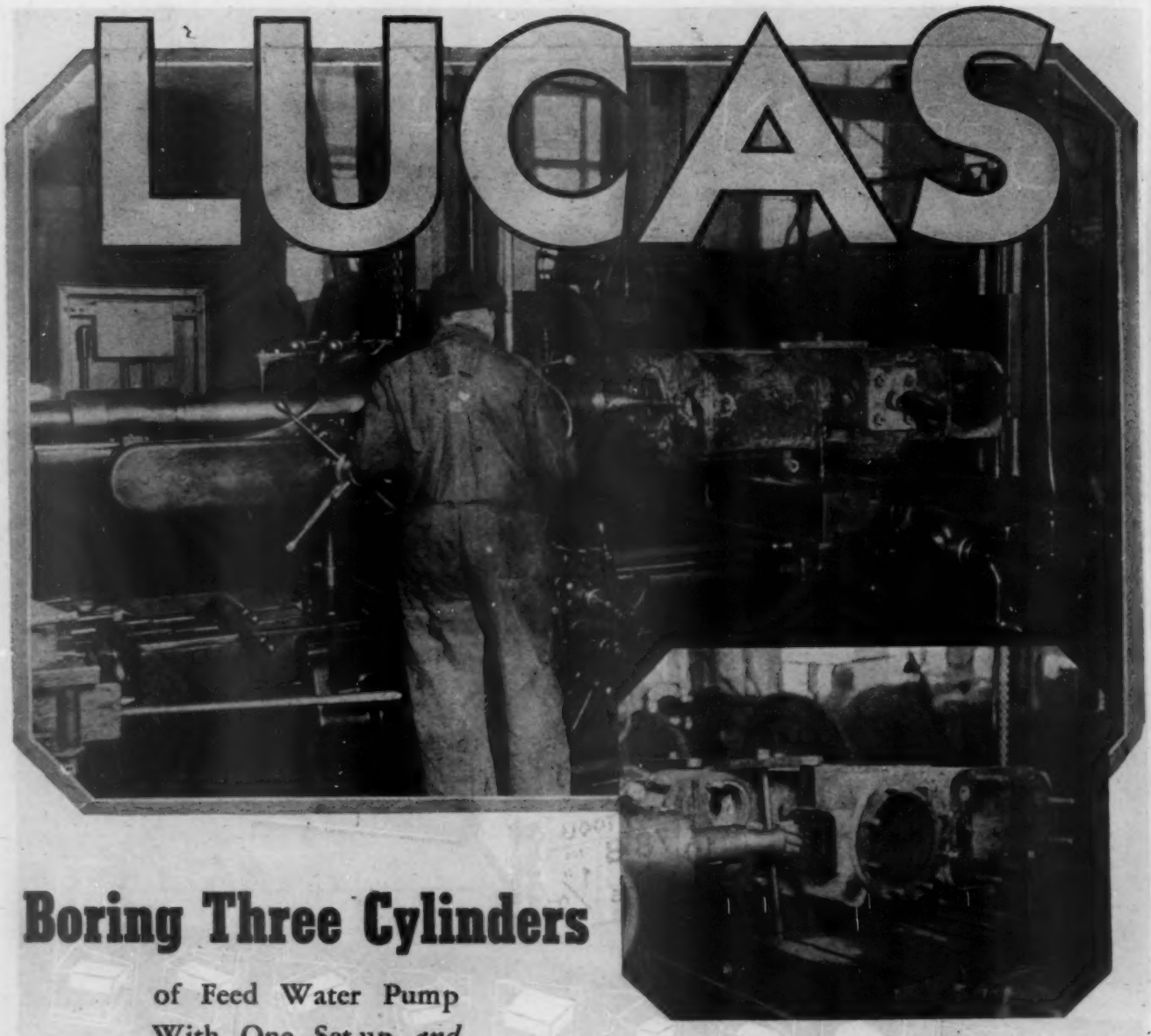
For complete details and catalog, write:

NELSON SPECIALTY WELDING EQUIPMENT CORPORATION

Dept. R, 440 Peralta Ave., San Leandro, Calif.

Eastern Representative: Camden Stud Welding Corp. Dept. 122, 1416 So. Sixth St., Camden, N. J.

NELSON STUD WELDERS & STUDS



Boring Three Cylinders

of Feed Water Pump With One Set-up *and* Milling Main Valve Seat on The Same Machine

THIS large feed water pump is set up and machined with the same ease and dispatch as smaller ordinary work.

The first operation (shown in the inset, close-up view) consists of milling the main valve seat and undercutting outer face to raise valve seat 1/16 of an inch.

On the second operation—three cylinders, the hot water cylinder, cold water cylinder and steam cylinder are bored at one set-up.

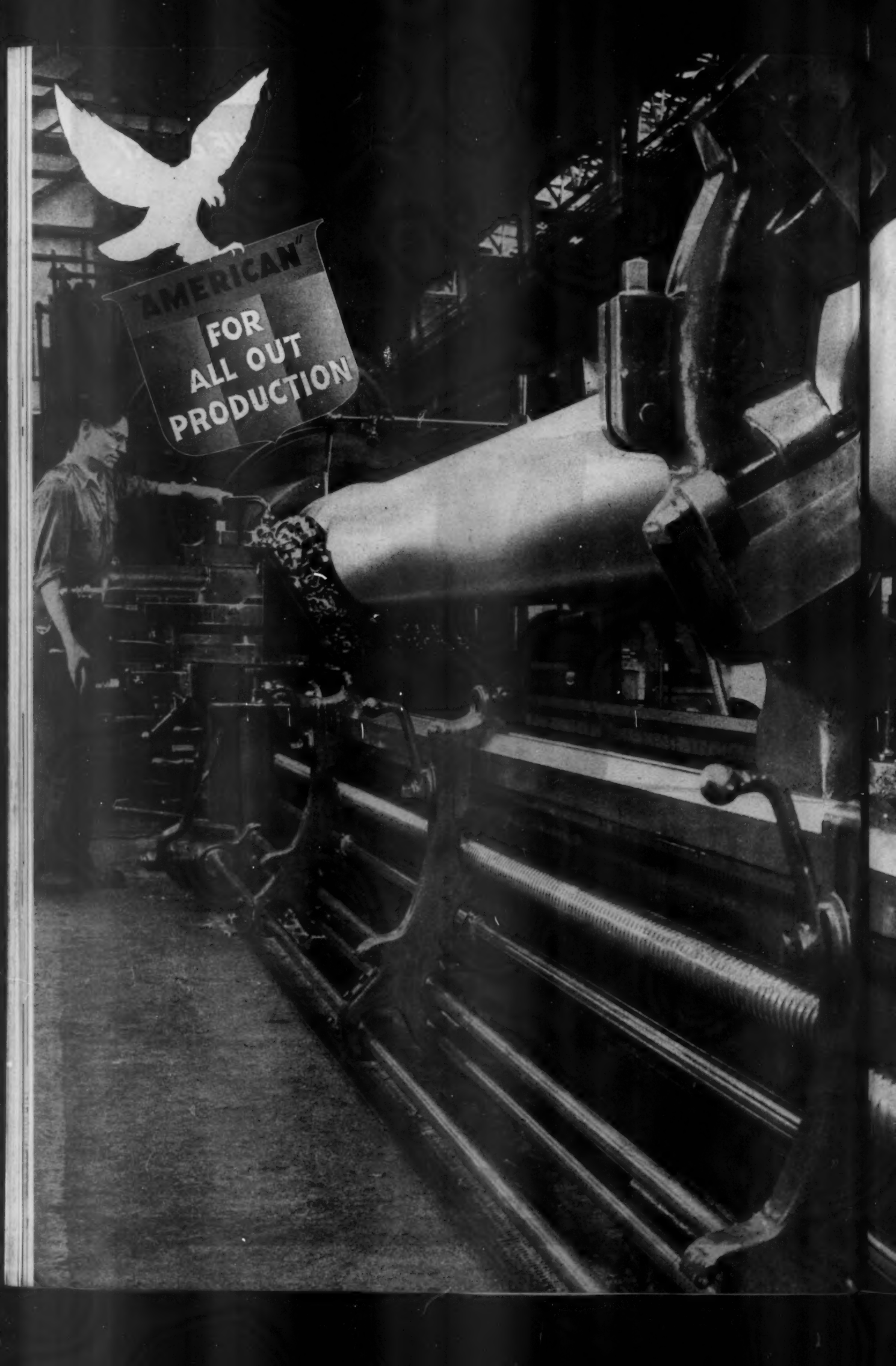
The Lucas "Precision" Boring, Drilling and Milling Machine, not only saves time and labor on the general run of shop work, but as the machinist put it "Do not know how some of these jobs would be handled if it was not for this Lucas."

Note: The many actual photographs of locomotive jobs on the Lucas, used in our advertisements, are definite proof that this time-tried machine is used extensively in railroad shops.

Write for circular A-74. It explains the details and many advantages of this powerful, versatile, convenient and accurate machine.

THE LUCAS MACHINE TOOL CO.

CLEVELAND **OHIO**


AMERICAN
FOR
ALL OUT
PRODUCTION

MIGHTY LATHES *Turn* MIGHTY SHAFTS *for* THE U.S. NAVY

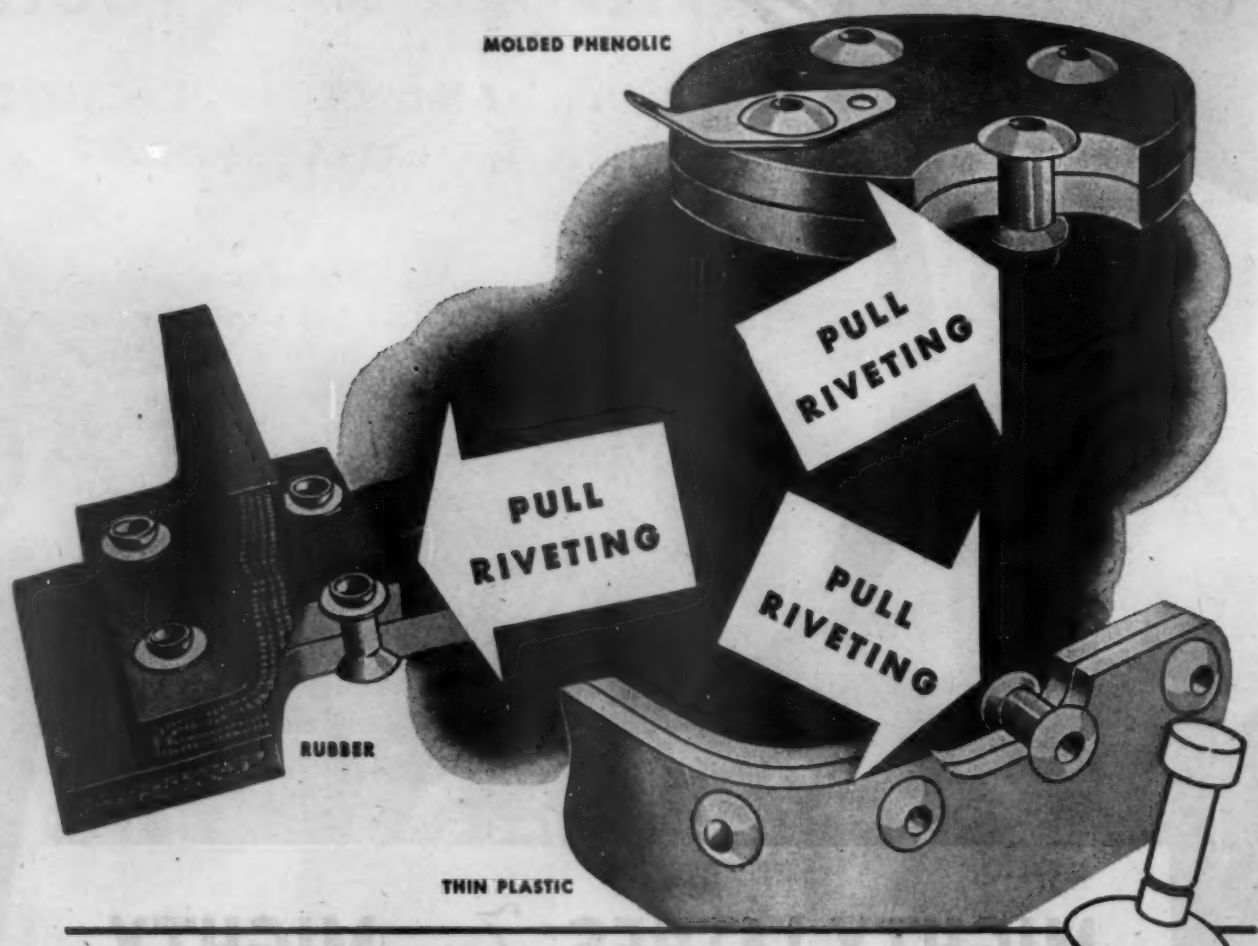
"AMERICAN" 48" Lathes, both in Navy Yards and Contractors' Plants, are adding their enormous power and productive capacity to the building of our "two-ocean" Navy.

True, work like this is not encountered in railroad shops, but when the power, stamina and operating ease of "AMERICAN" Lathes are turned to railroad shop operations, production costs are bound to tumble.

THE AMERICAN TOOL WORKS COMPANY

Lathes and Radial Drills

CINCINNATI, OHIO, U. S. A.



What do you mean, PULL* *riveting?*

Cherry Rivets are used for all blind riveting. But a lot of smart producers —designers, engineers, manufacturers— are using these extremely versatile and easy-to-use rivets on jobs that are not blind at all. Cherry Rivets make production jobs possible with little or no tooling or special set-up. Cherry Rivets can be used in soft or brittle materials that ordinarily can't be riveted at all. Cherry Rivets make most any job a better looking job even in hard-to-get-at places. It's all due to the Cherry method of upsetting—a pull instead of a pound.

CHERRY RIVETS, THEIR MANUFACTURE AND APPLICATION ARE COVERED BY U. S. PATENTS ISSUED AND PENDING.

Cherry Rivet
Company
LOS ANGELES, CALIFORNIA

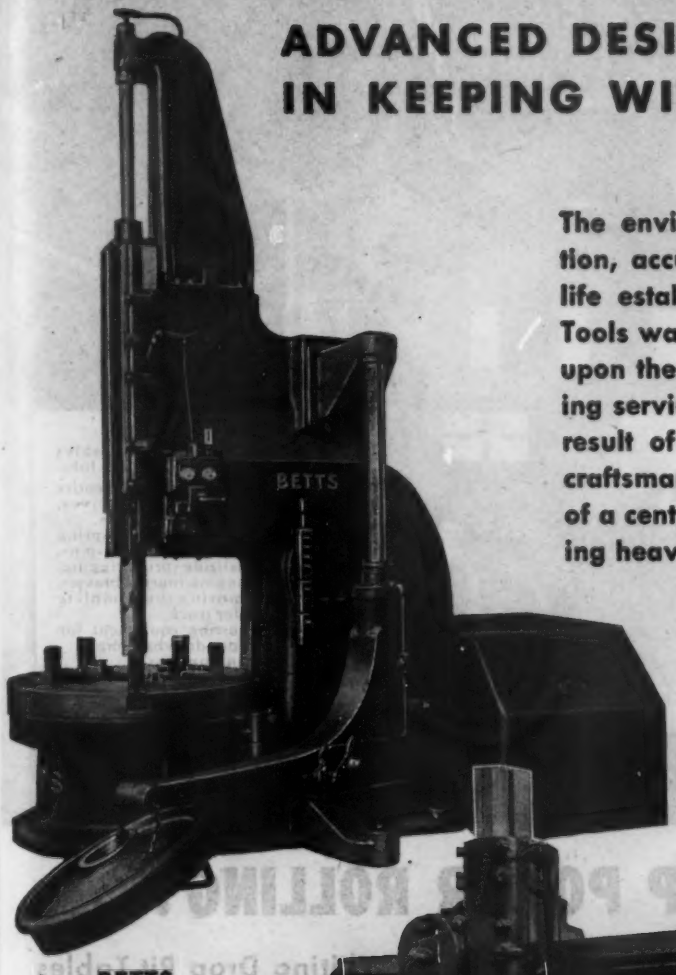
If you think it sounds impossible read this book. Ask for Handbook No. A-43. Write to Department A-277, Cherry Rivet Company, 231 Winston Street, Los Angeles 13, California.

*Cherry Riveting—with a pull instead of a pound.

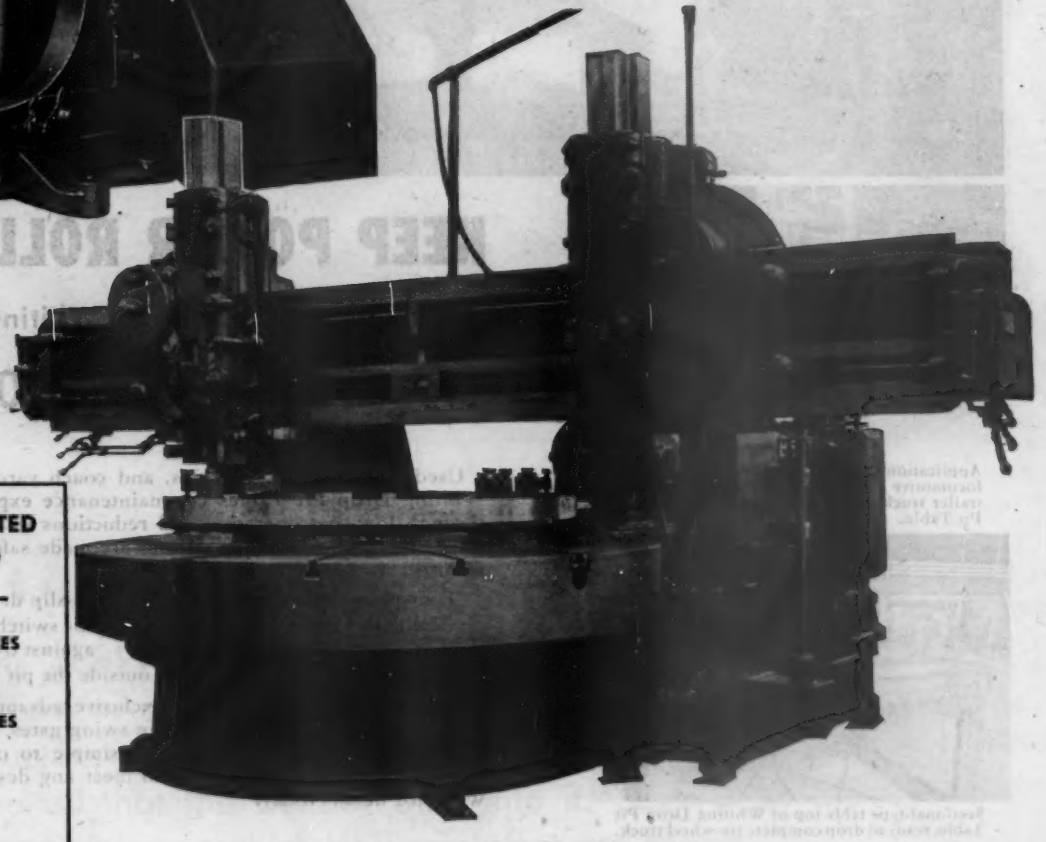
CONSOLIDATED RAILROAD SHOP TOOLS

ADVANCED DESIGN AND CONSTRUCTION IN KEEPING WITH RAILROAD PROGRESS

The enviable reputation for stepped-up production, accurate performance, and long productive life established by Consolidated Railroad Shop Tools was not earned over night. It has been built upon their record of years of continuous, satisfying service in hundreds of railroad shops . . . the result of seasoned engineering skill and expert craftsmanship supported by nearly three quarters of a century of experience in designing and building heavy machine tools.



BETTS HYDRAULIC FEED CAR WHEEL BORER



BETTS 112" HEAVY DUTY TIRE MILL

OTHER CONSOLIDATED RAILROAD SHOP TOOLS INCLUDE—

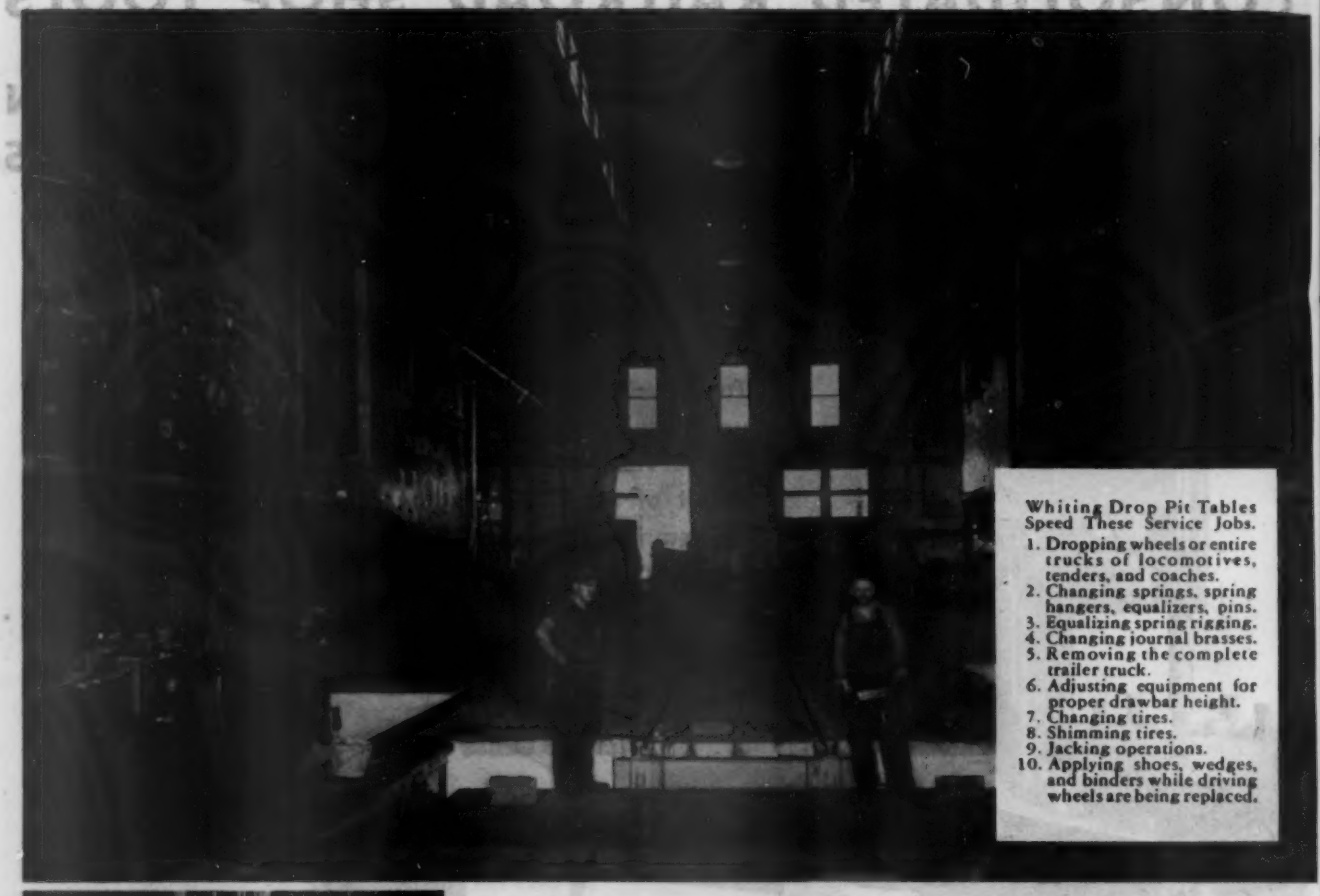
- CENTER DRIVE AXLE LATHES
- END DRIVE AXLE LATHES
- JOURNAL TRUING LATHES
- PROFILE MILLING MACHINES
- SLAB MILLING MACHINES
- ROD MILLING MACHINES
- DRILL PRESSES
- CRANK PLANERS
- ROD BORING MACHINES
- CYLINDER BORING MACHINES

BETTS • BETTS-BRIDGEFORD • NEWTON • COLBURN • HILLES & JONES • MODERN

CONSOLIDATED MACHINE TOOLS

CONSOLIDATED
MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK



Whiting Drop Pit Tables Speed These Service Jobs.

1. Dropping wheels or entire trucks of locomotives, tenders, and coaches.
2. Changing springs, spring hangers, equalizers, pins.
3. Equalizing spring rigging.
4. Changing journal brasses.
5. Removing the complete trailer truck.
6. Adjusting equipment for proper drawbar height.
7. Changing tires.
8. Shimming tires.
9. Jacking operations.
10. Applying shoes, wedges, and binders while driving wheels are being replaced.

Application of crane sling under cab end of locomotive was made possible by dropping trailer truck with booster on Whiting Drop Pit Table.

Sectional-type table top of Whiting Drop Pit Table, ready to drop complete six-wheel truck.

Special Whiting Drop Pit Table removing truck from subway car still coupled to train. Truck replacement is speeded by double track table top.

KEEP POWER ROLLING . . .

with fast, low-cost repairs on Whiting Drop Pit Tables

SAFETY • SPEED • ECONOMY OF OPERATION

Used in roundhouses, shops, and coach yards of 76 railroads, Whiting Drop Pit Tables cut maintenance expenses 25% to 75% through low-cost operation and reductions in layup time. Operations usually considered hazardous are made safe by these Whiting features:

Four-point table support
Ability to sustain full load at any point on the table top
Non-slip drift operation
Limit switches which guard against over-riding
Control from outside the pit

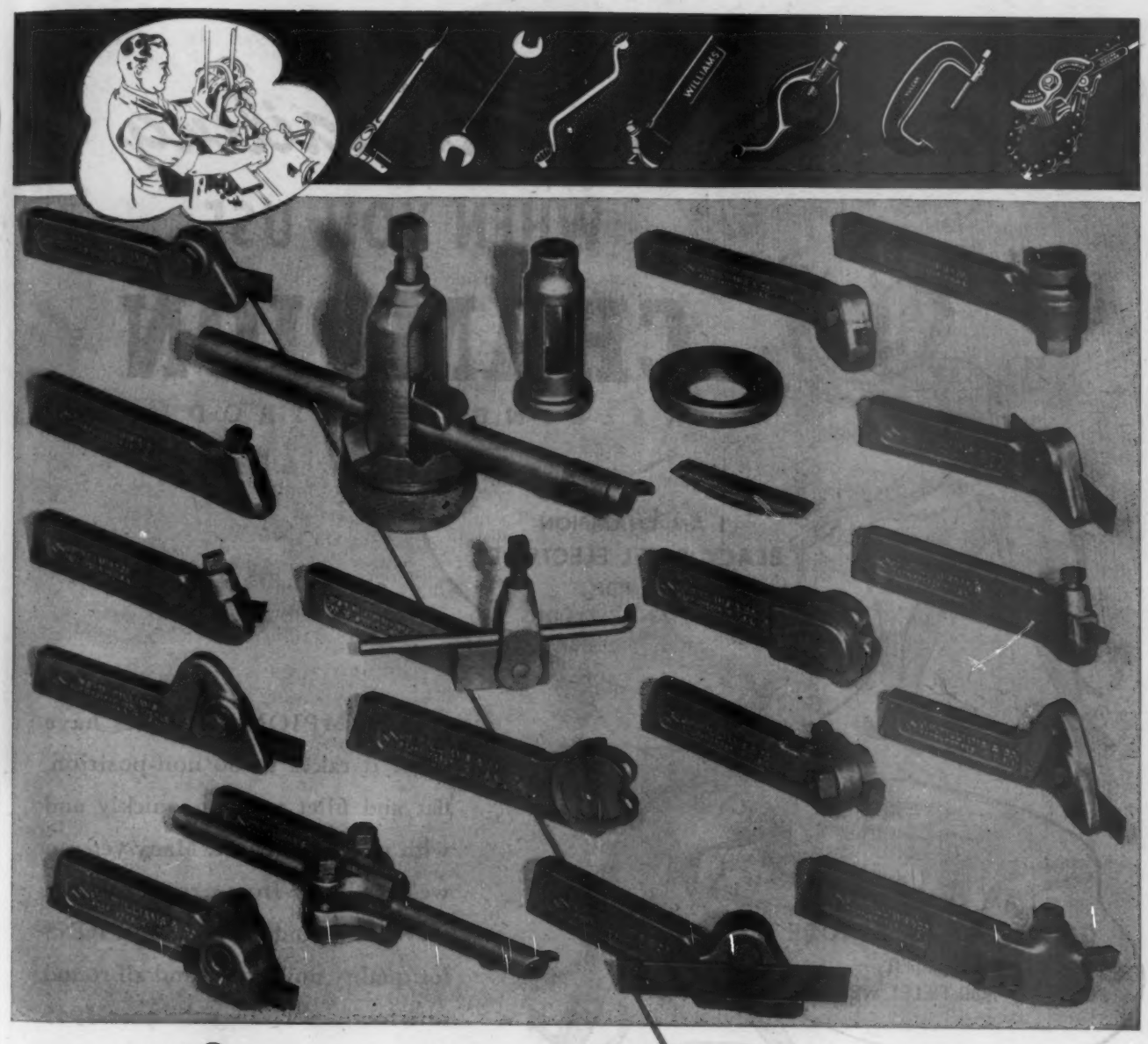
Designed with a number of exclusive advantages (nested table tops, shoulder pits, self-supporting swing gates, and sectional table tops), Whiting Drop Pit Tables are simple to operate. Flexible in design, they can be engineered to meet any desired requirements. Write for details today.

WHITING
CORPORATION

15609 Lathrop Avenue, Harvey, Illinois

RAILROAD MAINTENANCE EQUIPMENT

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, and Washington, D. C. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario.



Pattern FOR PRODUCTION

Williams' Tool Holder System provides a well-engineered tool for every operation of lathe, planer and shaper . . . a production-proven tool that enables you to get from a machine all that the builder built into it. Several of the design advantages which Williams offer are found in no other tool holders. Descriptive literature is available on request. Williams' Tool Holders are sold by leading industrial distributors everywhere.
J. H. Williams & Co., Buffalo 7, N.Y.

WILLIAMS
DROP-FORGINGS AND DROP-FORGED TOOLS

EVERY JOB IS *Smooth sailing* WHEN YOU USE CHAMPION

WELDING ELECTRODES

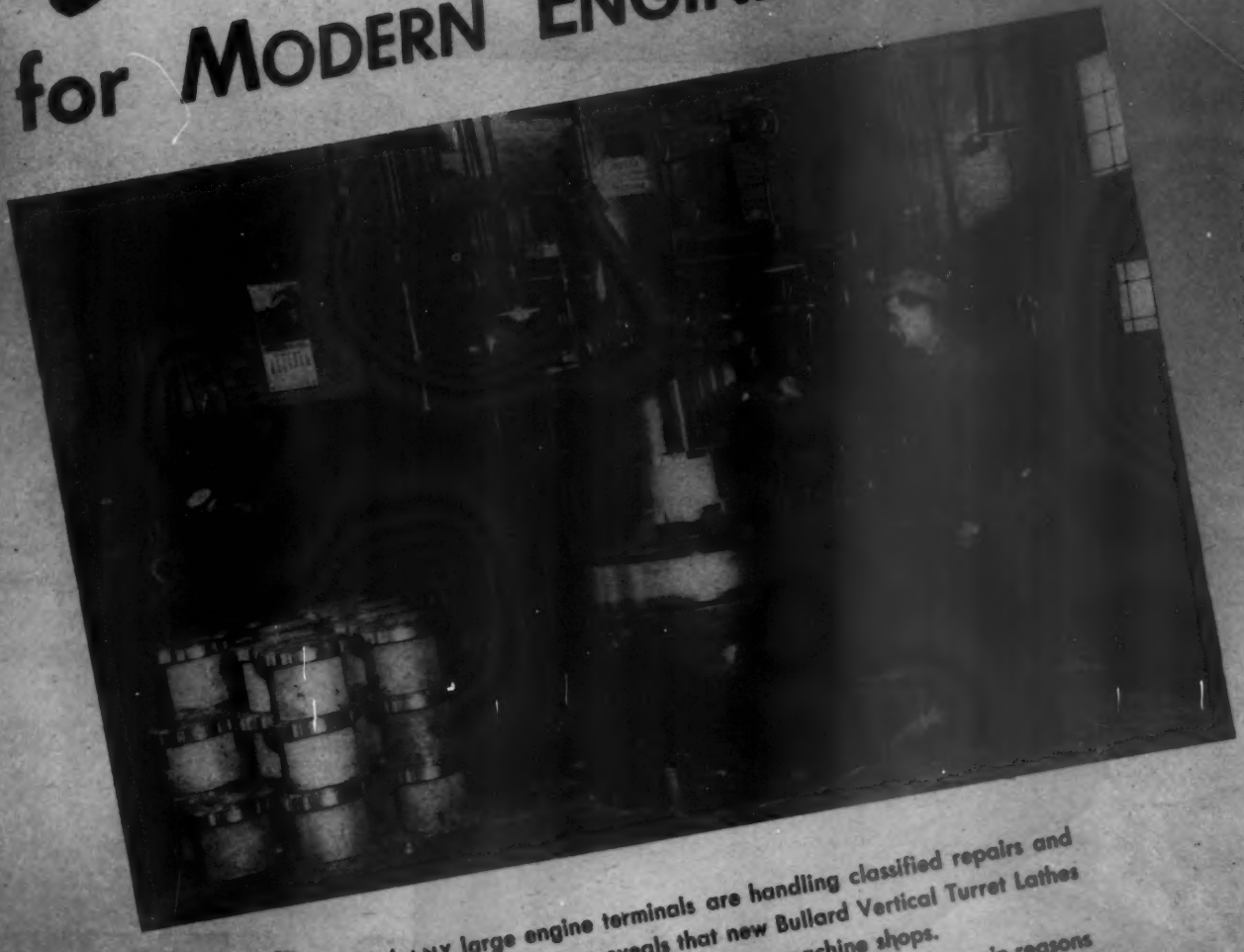
★ CHAMPION electrodes have what it takes to do non-position, flat and fillet welding quickly and with minimum effort. Many veteran welders know from experience that they can depend upon CHAMPIONS for quality, uniformity and all round satisfaction. During the year 1945 you can make no better choice than CHAMPION electrodes for they are all the name implies.

THE CHAMPION RIVET CO.

11600 HARVARD AVENUE • CLEVELAND, OHIO

EAST CHICAGO, IND.

New Bullards for Modern Engine Terminals



MANY large engine terminals are handling classified repairs and a recent survey reveals that new Bullard Vertical Turret Lathes are being installed in these round house machine shops.

Precision, economical production and versatility are the main reasons why mechanical department supervisors specify new Bullards for the engine terminals which have to pinch hit for the back shops.

Above illustration shows a 42" V. T. L. recently installed in a large engine terminal. It is kept busy on all types of general boring, turning and facing jobs . . . rod brasses, driving boxes, packing rings, cylinder heads, valve bushings and many utility jobs.

The economies effected by Vertical Turret Lathe practice in round house machine shops help to reduce the cost of repairs. Why not plan on new Bullards for these vital points?

BULLARD

THE BULLARD COMPANY

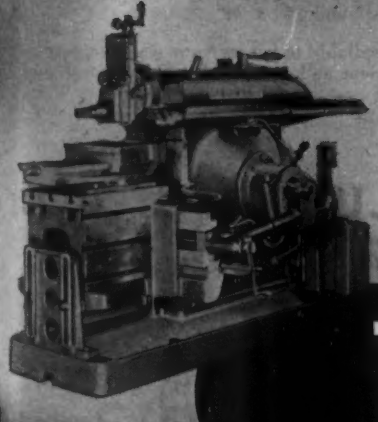
BRIDGEPORT 2, CONNECTICUT

INTERNAL SHAPING...

In the field of internal shaping alone, Cincinnati Shapers are used on a long list of "hard to get at jobs"—from cutting internal key ways to cutting symmetrical and non-symmetrical holes.

We show a Cincinnati Shaper shaping internal key ways in a blind hole—a "hard to get at job." Remember, a Cincinnati Shaper, the tool of many uses, will always be busy in your shop.

Write for Catalog N-2, describing these powerful accurate Shapers.



THE CINCINNATI SHAPER CO.

CINCINNATI OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

"It sounds to me like a job for Aeronautical Products, Inc."

WHAT KIND of precision parts does *your* post-war job require? Automatic screw machine . . . grinding . . . thread grinding . . . thread milling . . . superfinishing . . . hyprolapping . . . heat treating . . . nitriding . . . plating . . . magnafluxing . . . tolerances as low as .0001? The point is this: If your assemblies require the machining of parts to hair-breadth limits, we're equipped to do the job faster . . . better! In one organization with two great plants, ALL the facilities ANY job requires.

AND THAT'S NOT ALL! With a solid foundation built on the top-speed production of precision units for aircraft engines long before Pearl Harbor, plus 100% war output, it stands to reason we'll retain our leadership after the war is won! If *you* have a post-war problem, consult "Precision Pacesetters", with a *record of accomplishment!* Want ideas? Engineering help? Costs? Write our Executive Sales Offices for complete list of equipment and facilities.

● *THE SUCCESS of The Aeronautical Products, Inc. Helicopter, designed and built by our own craftsmen, promises new accomplishments in the post-war age of flight!*

AERONAUTICAL PRODUCTS, Inc.

DETROIT PLANT
and Administrative Offices:
18100 Ryan Road, Detroit 12

OHIO PLANT:
Washington Court House
Ohio

AIRCO

STYLE 9802
MEDIUM WEIGHT
HEATING TORCH
and
STYLE 724
MULTI-FLAME TIPS

Ideal Combination FOR LOCALIZED HEATING
for BENDING, STRAIGHTENING and SHRINKING

● Wherever concentrated localized heating is required for bending, straightening and shrinking steel plate and for silver brazing heavy copper plate in the manufacture of pipe, you can select no better equipment for the job than the Airco Style 9802 Medium Weight Heating Torch with the proper size of Airco Style 724 Multi-flame Tip.

The torch is comparatively light in weight, easily handled and gives full freedom to the operator, yet it has large passages through the valves, tubes and head to afford ample gas capacity.

Four extensions have been provided: one 12" straight extension and 18", 24" and 42" angular extensions.

Airco Style 724 Multi-flame Oxyacetylene Tips are available in a complete range of five sizes to meet the requirements of every heavy heating job. Style 717 and Style 718 Multi-flame Propane Tips are also available for use with the Style 9802 Torch.

An Airco representative will be pleased to demonstrate this ideal heating combination on your work. Ask your nearest Airco office.

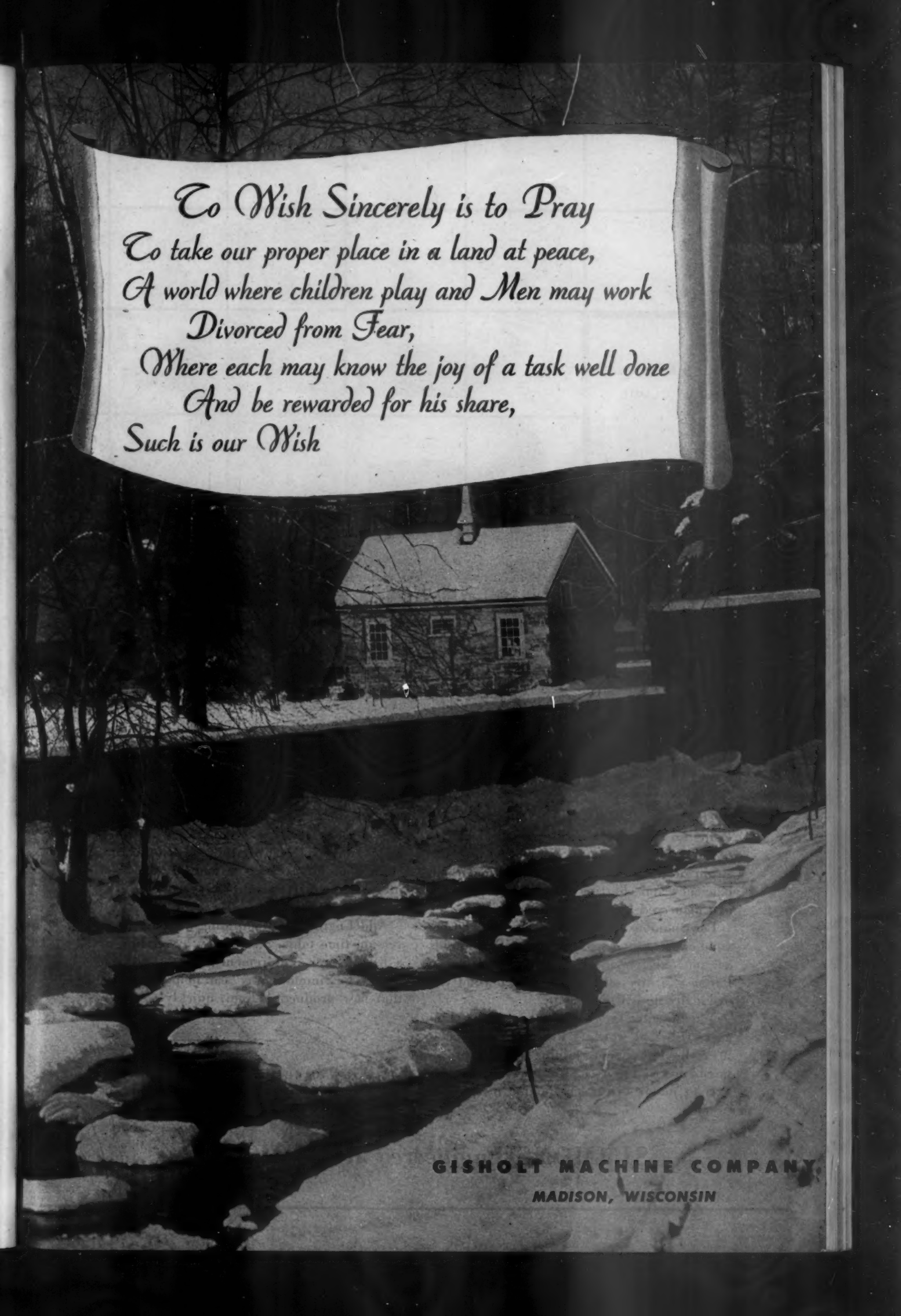
★ BUY UNITED STATES WAR BONDS ★

AIRCO

AIR REDUCTION
General Offices: 60 East 42nd Street, New York 17, N.Y.
In Texas: Magnolia Airco Gas Products Co. • General Offices: Houston 1, Texas
Offices in all Principal Cities

STYLE 724 MULTI-FLAME HEATING TIPS—ILLUSTRATIONS ARE FULL SIZE

SIZE 11 SIZE 12 SIZE 13 SIZE 14 SIZE 15


To Wish Sincerely is to Pray
To take our proper place in a land at peace,
A world where children play and Men may work
Divorced from Fear,
Where each may know the joy of a task well done
And be rewarded for his share,
Such is our Wish
GISHOLT MACHINE COMPANY
MADISON, WISCONSIN

GIVE YOUR MACHINE TOOLS A POST-WAR "PHYSICAL"

Whatever your reconversion plans, the successful transition to consumer goods production depends largely on how well your *present* machine tools will measure-up to their post-war job.

That's why many leading manufacturers are losing no time in taking a physical inventory of their basic equipment, estimating how the strain of war production has impaired their efficiency and charting a systematic program of *Engineered Rebuilding* by Simmons.

For Simmons' specialized techniques go beyond conventional repair methods. Worn tools are not only restored to maximum efficiency but new utility often "built in" beyond the originally designed capacity.

Your maintenance engineers or works managers will find working with Simmons' engineers helpful in determining what improvements are required—hydraulic drive, conversion to motor drive, lengthening of beds or tables, widening of housings, raising of rails or heads, new type surface finishes or labor saving devices.

Simmons' extensive manufacturing facilities are adapted to rebuilding any type or size of machine tool. Typical assignments include the heaviest car wheel lathes, boring mills and planers for leading railroad shops...machine tools of every type and size for steel mills, automotive plants, shipyards and aircraft factories.

Add Engineered Rebuilding to your reconversion time table. Start today by sending us a list of your requirements. We'll show you how "The Simmons Way" can help you set-up that new production line...quickly!

President

SIMMONS MACHINE TOOL CORPORATION
1825 NORTH BROADWAY, ALBANY 1, NEW YORK

SIMMONS *Engineered* REBUILDING

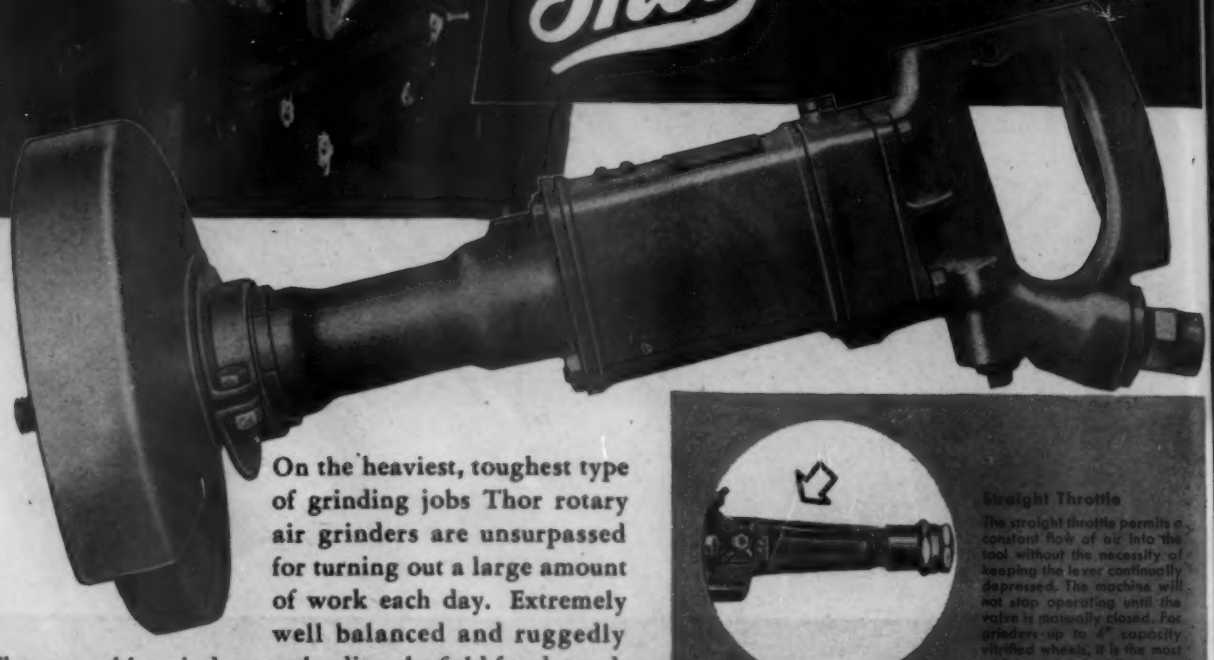
NON-MAGNETIC ROL-MAN

RESISTS GALLING AND SCORING

ROL-MAN

Tough Grinding Jobs MADE EASY with

Thor PORTABLE AIR GRINDERS



On the heaviest, toughest type of grinding jobs Thor rotary air grinders are unsurpassed for turning out a large amount of work each day. Extremely well balanced and ruggedly built, Thor portable grinders are leading the field for dependable, continuous service at a minimum maintenance cost. These efficient grinders have an abundance of mighty power and yet are exceptionally thrifty on the air they require to operate.

WIDE RANGE OF SIZES AND MODELS

There are 50 different sizes and models of Thor rotary air grinders . . . a model for any and every type of grinding job. All of the models can be furnished with either of the three throttle types shown. For full details, specifications, prices and delivery information, write for Thor Catalog No. 52B.

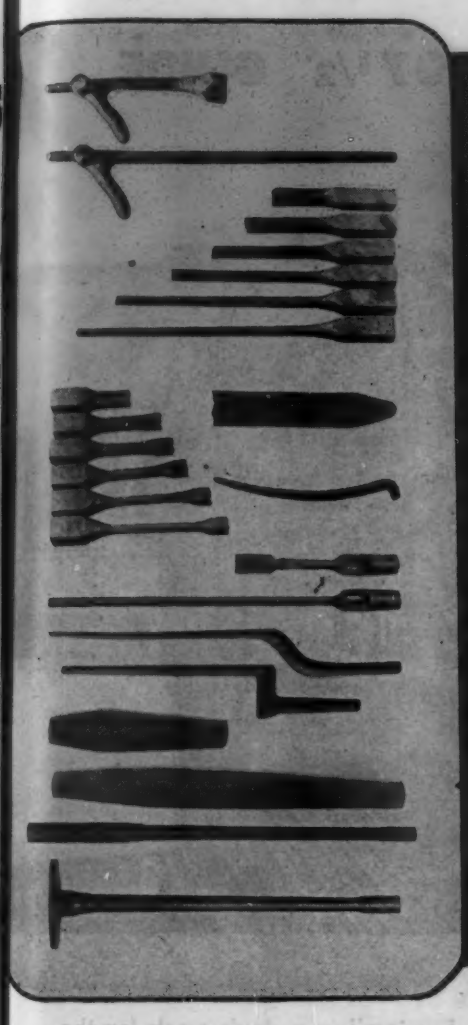
Straight Throttle
The straight throttle permits a constant flow of air into the tool without the necessity of keeping the lever continually depressed. The machine will not stop operating until the valve is manually closed. For grinders up to 4" capacity vitrified wheels, it is the most widely used handle type.

Grip Throttle
The grip throttle is the most desirable type for grinders of 6" wheel capacity and larger. It is adapted for overhead operation, for working in close and awkward places, and for work where a straight forward thrust of the machine is desired. On the grip handle, the throttle is self-closing when the trigger is released.

Lever Throttle
Safety is the primary feature of the lever throttle. The instant the lever is released the power is cut off. This automatic action is helpful in hazardous work on construction and maintenance and reduces accidents due to carelessness.

INDEPENDENT PNEUMATIC TOOL COMPANY
600 W. Jackson Blvd., Chicago 6, Illinois
Los Angeles New York

AJAX WIDE ADJUSTMENT FORGING ROLLS



The Correct Complement to Forging Presses and Upsetters for Efficient Production of Reduced Straight and Tapered Forgings

★ For high speed, low cost production of many forgings for military and industrial uses wide adjustment forging rolls are of great advantage. These rolls are highly efficient in drawing blanks preparatory to forging in press, hammer or upsetter or for drawing slender shanks on pieces that have been previously forged.

The operation of Ajax Rolls on blanks of steel, aluminum or magnesium is extremely simple and their production of long, uniform reduced straight or tapered sections from blanks of large cross section is many times that of the fastest swagers or hammers.

Today on such products as Rifle Barrels, Machine Gun Barrels, certain types of Bayonets, Automatic Rifle Barrels, Anti-tank Gun Barrels and Airplane Propeller Blanks, alert forging shop operators are establishing new records and gaining valuable experience in the most advanced methods of high speed forging production. And tomorrow, in the competitive post war era, these same operators who have this modern equipment and valuable experience will be the leaders in the production of Automobile Axle Drive Shafts, Connecting Rod Blanks, Spring Leaves, Cable Bolts, Railroad Brake Levers, Brake Shoe Keys and a large variety of other straight and tapered forgings.

WRITE FOR BULLETIN No. 91-A

THE
AJAX
MANUFACTURING
COMPANY

EUCLID BRANCH P. O., CLEVELAND 17, OHIO
621 MARQUETTE BUILDING • CHICAGO 3, ILLINOIS

NOW, FACE GRINDING OF 107½" GUIDE BAR MADE EASY!

A FEW OF THE RAILROAD JOBS YOU CAN DO FASTER AND BETTER WITH A DIAMOND FACE GRINDER:

- Guides
- Chafing Plates
- Lateral Clevis Blocks
- Wedges
- Reverse Links
- Engine Truck Pedestals
- Spring Saddles
- Valve Cross Heads
- Plates and Guides
- Air Pump Cylinders
- Steam Pipe Joints
- Flat Spring Hangers
- Shear Knives
- Engine Truck and Trailer Boxes
- Engine Truck Collars
- Spring Equalizers
- Link Blocks
- Locomotive Pedestal Caps
- Pedestal Cap Filler Blocks
- Eccentric Cranks

Grinding this 107½" guide bar is all in a day's work for the Diamond Face Grinder—3 sides faced easily, using a simple, quick handling fixture which will accommodate any guide bar.

Face grinding not only saves time but saves material, too, for you only have to take off enough to produce the first flat surface.

Get the facts about this bigger, huskier face grinder. See how easily it handles practically *any* job with a flat surface—cast iron or cast steel—better and faster than conventional grinders or cutting tools. Once you learn the facts you'll want to own and keep your Diamond Face Grinder the busiest machine in the shop.

MAIL TODAY FOR NEW FOLDER

Diamond Machine Company of Philadelphia
2510 Aramingo Avenue, Philadelphia 25, Pa.

Gentlemen: Please send me promptly your Bulletin 44-G which shows how to speed-up production with the Diamond Face Grinder.

Name _____ Title _____

Company _____

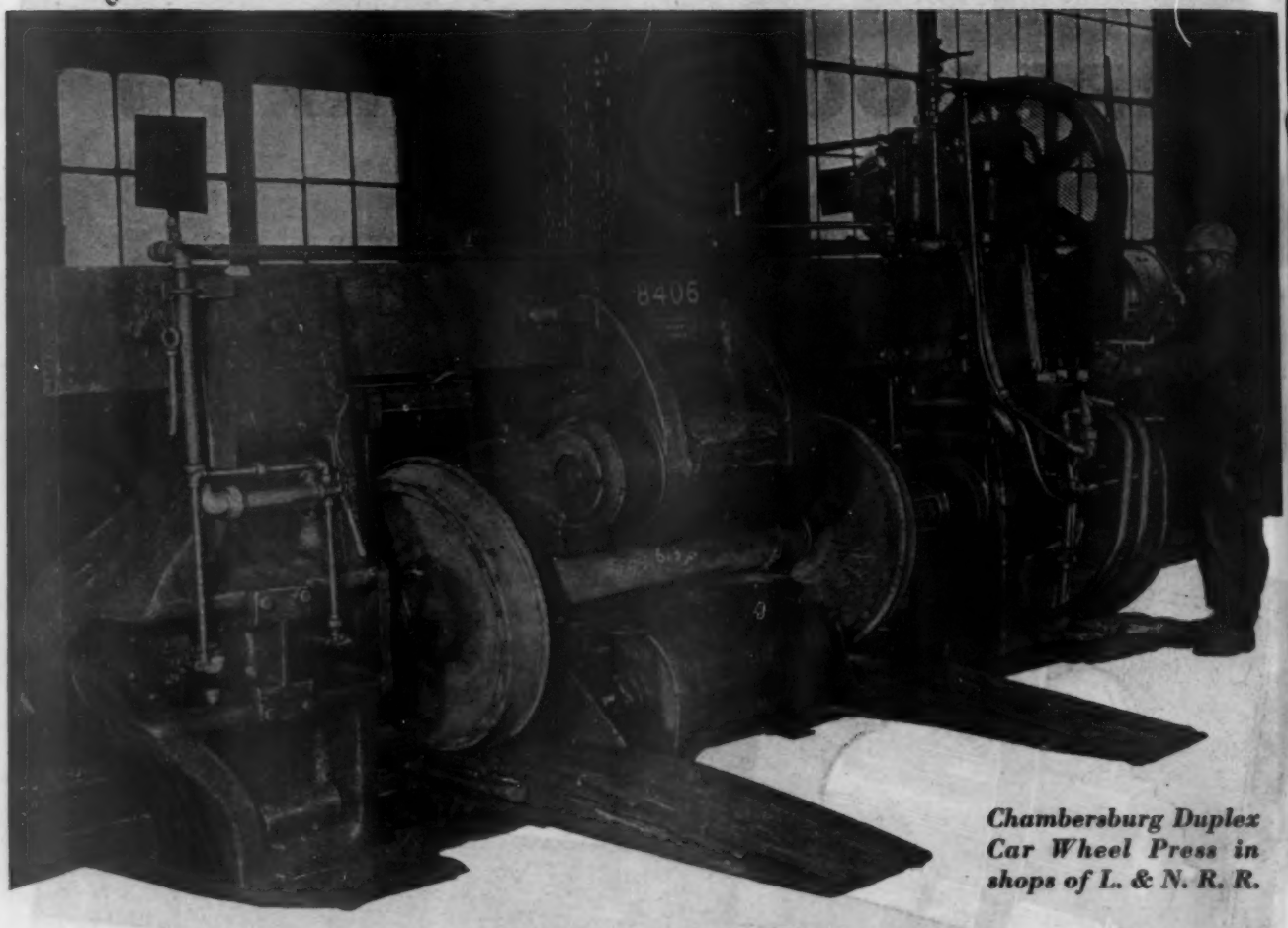
Address _____

City _____ State _____

"THE DIAMOND THAT CUTS YOUR COSTS"

DIAMOND
MACHINE COMPANY
OF PHILADELPHIA

Subsidiary of American Engineering Company, builders of fine machinery for over 75 years, and manufacturers of Taylor Stokers, Marine Deck Auxiliaries, Loaded Hoists, Hele-Shaw Field Pumps



Chambersburg Duplex Car Wheel Press in shops of L. & N. R. R.

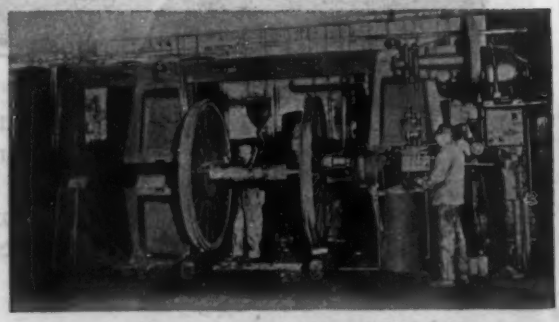
40 Seconds Floor-to-Floor Car Wheel Demounting Time

Seventy-four Seconds per Wheel for Mounting

Chambersburg Wheel Presses have established records in railroad shops all over the country for the speed with which they permit the rapid mounting or demounting of wheels. On the car wheel presses, records have been made for demounting wheels as low as 40 seconds per wheel floor-to-floor —mounting time as rapid as 72 seconds.

These presses have been designed and improved with the needs of the railroad shop constantly in mind—the necessity for speed in getting car wheels back in service has been paramount.

Write for details of today's Wheel Presses. Bulletin 202 describes the Duplex Car Wheel Press. Bulletin 212-1 describes the Driving Wheel Press.



Chambersburg Vertical Driving Wheel Press

CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.

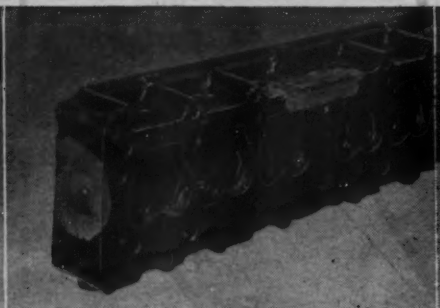
ARMY E NAVY

CHAMBERSBURG

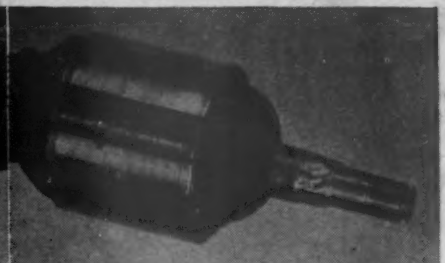
HAMMERS · CECOSTAMPS · PRESSES

AVOID WELDING DISTORTION STRESSES AND OVERHEATING

Arc welding bombsight hanger on frame member of plane produced severe warping and misalignment. Eutectic Low Temperature Welding prevented distortion and formed strong joints.



Cast iron motor heads are safely repaired without danger of subjecting to stresses, eliminating need for costly and lengthy after machining always necessary to correct distortions.



Worn motor armature shaft resurfaced by Eutectic Low Temperature Welding completely avoiding warping of shaft and preventing destruction of windings by excessive heat.

WITH EUTECTIC

EUTECTIC (Pronounced U-tec-tic) Reg. U.S. Pat. Off.

Low Temperature WELDING RODS

Every day—there are jobs that can be done better the EUTECTIC way. Try it today!

Bond metals at temperatures as low as 340° F. Reduce heat consumption . . . cut welding costs

Now, without resorting to high temperatures, you can gain the advantage of the strong bonds formed by fusion welding.

The most revolutionary welding development of modern times—EUTECTIC *Low Temperature* Welding enables you to join metals at temperatures below the fusion points of base metals.

Eutectic welding rods and fluxes are available for joining all metals by means of gas—arc—induction—furnace and all standard methods of heating.

Try Eutectic for Production—Salvage and Maintenance welding.

EUTECTIC WELDING ALLOYS COMPANY • 40 WORTH STREET, NEW YORK 13, N. Y.

☐ Send me full information for purchasing *introductory assortment* of important Eutecrods for Production Salvage and Maintenance welding.

☐ Please send me The Eutectic Catalog **FN-1** containing complete information about Eutectic Low Temperature Welding and its 6 great advantages.

Name_____ Position_____

Company_____ Address_____

"It's like finding 3 lost work hours every day!"

...when you switch to the SHORT CUT FASTENING METHOD

On many jobs, the short cut fastening method . . . Parker-Kalon Self-tapping Screws . . . saves from 30% to 50% in assembly time and labor.

That means a gain of 3 or more *extra* hours per day – hours you would use up in needless tapping, awkward bolting, or riveting in hard-to-reach places.

Leading railroads and car builders find that, for most fastenings in light and heavy steel, cast iron, aluminum, brass, or plastics, there's a P-K Self-tapping Screw that will save time, lower costs, usually make the assembly stronger.

Call in a P-K Assembly Engineer to check over your fastening jobs with you. He'll help you salvage those lost work-hours, and show you how simple it is to change to the short cut method overnight, without skilled help or special tools. Parker-Kalon Corporation, 208 Varick Street, New York 14, N. Y.

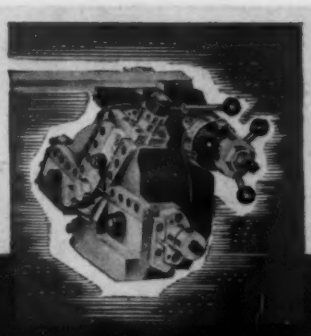
ONE EASY OPERATION completes the fastening . . . just drive the P-K Self-tapping Screw into a plain, untapped hole. No tapping and tapping plates – no troublesome lining up – no awkward bolting or riveting.

GREATER SECURITY! Compare tight engagement of P-K Screw (at left) in metal with loose fit of machine screw (at right) in tapped hole. A P-K Screw fastening will not loosen, even under severe vibration.

POWER DRIVING is possible with P-K Self-tapping Screws. Added to simplicity of fastening, this often doubles the rate of speed that would be attained with other fastening devices, such as machine screws, bolts, rivets.

PARKER-KALON
Quality-Controlled
SELF-TAPPING SCREWS

For Every Metal and Plastic Assembly



Fast, Accurate Production

with the new Warner & Swasey Taper Frame Bolt Turner

Turning a locomotive frame bolt with a Warner & Swasey Taper Frame Bolt Turner on a Warner & Swasey 1A Universal Turret Lathe. Setup does not interfere with other tools in the hex turret used for normal turning operation of the turret lathe.

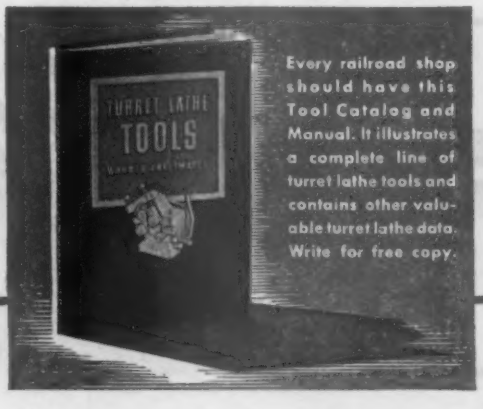
RAILROAD shops are called upon to produce locomotive taper frame bolts and other accurate taper jobs in volume and on rush order.

With a Warner & Swasey Taper Turner any length or diameter frame bolt can be turned, ready to drive in a few minutes. *Only one cut is required to turn the taper — accurately and to size.*

Size to be cut is controlled to extreme accuracy by direct reading scale and dial adjustment.

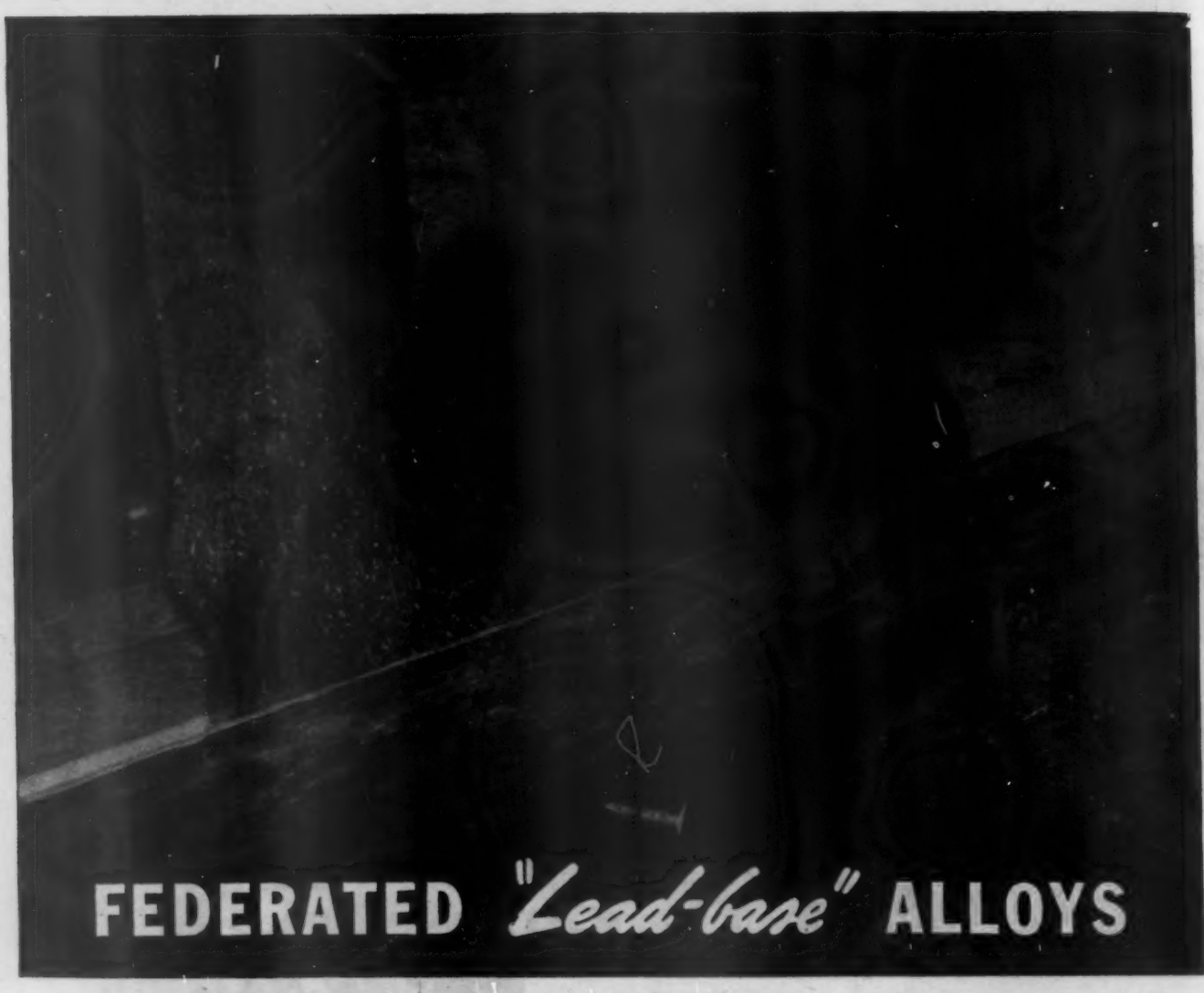
Other tools in hex turret stations are free for other turning jobs without wasting time for new tooling setups. Warner & Swasey, Cleveland, Ohio.

It's easy to set a new or reground cutter on center. Adjustments for different diameter sizes are quickly made by setting scale and dial indicators.



Every railroad shop should have this Tool Catalog and Manual. It illustrates a complete line of turret lathe tools and contains other valuable turret lathe data. Write for free copy.

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS ...WITH A WARNER & SWASEY



STAND UP AND TAKE IT!

Federated *lead-base* alloys, particularly adapted for the heavy machinery employed in the logging and timber industry, are able to "stand up and take it" in today's continuous logging service. In fact, wherever wheels turn there is very likely a Federated lead base bearing alloy that will do the job. They offer these advantages:

1. Properties comparable to tin-base alloys
2. A method of application which prevents loose bearings
3. Easily lubricated
4. Resist fatigue at high temperatures
5. Highly stable
6. Cost 75% less
7. Available without priority

Order through your jobber or from the Federated office nearest you.

INGOT METALS AND WHITE METAL ALLOYS PRODUCED BY FEDERATED

ALUMINUM
BRASS
BRONZE
DIE CAST ALLOYS
SOLDER
BABBITT
TYPE METAL
ZINC DUST

All of these in standard specifications. Special alloys to your order.

FMD

Federated

METALS DIVISION

AMERICAN SMELTING and REFINING COMPANY

120 BROADWAY, NEW YORK (5) N. Y.

Nation-wide service with offices in principal cities

it's impossible!

time was when it was considered impossible to spot weld heavy gauges with a *balanced three-phase load* . . .

"THREE-PHASE" WELDING

now provides the answer!

Both manufacturers and power companies have long torn their hair over the problem of spot welding heavy gauges. Conventional AC single phase welders cause serious disturbance to the usual three-phase power supply, operate at low power factor because of the heavy reactive load, and demand high power due to the high secondary resistance.

In announcing the "THREE-PHASE", Sciaky presents a method of resistance welding heavy gauges which effectively solves these problems. By employing an ingenious system of rectification and reconversion, Sciaky welders now ***operate on a balanced Three Phase load at near unity power factor (use less KVA).***

Watch for subsequent announcements explaining the operation of the "THREE-PHASE."

SCIAKY BROS.

Manufacturers of a Complete Line of AC and DC Electric Resistance Welding Machines

4915 West 67th Street Chicago 38, Illinois

Offices in Detroit, Los Angeles, Washington and Cleveland

Representatives in Principal Cities

In England: Sciaky Electric Welding Machines, Ltd., London

In France: Sciaky S.A., 13, 15 Rue Charles Fournier, Paris

No. 85
FACE GRINDER

No. 47W "ABRASAW"
WET CUT-OFF
MACHINE

No. 161 HIGH SPEED
MOTOR DRIVEN
FLOOR GRINDER

No. 103 VERTICAL
HEAVY DUTY
SURFACE
GRINDER
SMOOTH
HYDRAULIC
OPERATION

RECOMMENDED FOR FAST, ACCURATE METAL REMOVAL

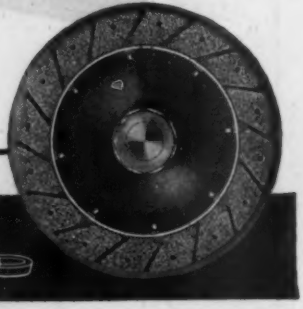
Wherever Accuracy & Production Count!

In innumerable metal working plants, the technique of metal removal has reached a high stage of excellence through the use of "Bridgeport" Grinders and Grinding Wheels. Wherever speed or an accurate, well-finished job are important, "Bridgeport" equipment demonstrates beyond all doubt that, peace or war, there is no substitute for quality material and expert engineering.

Long-lived, smooth-running bearings, efficient cooling, extreme ruggedness of frame and fittings, convenient location of controls and adjustments—these are just a few of the advantages which have placed "Bridgeport" equipment in many high production industries throughout the U. S. and foreign countries.

THE BRIDGEPORT SAFETY EMERY WHEEL CO., INC. • BRIDGEPORT, CONN., U. S. A.

Bridgeport



GRINDERS • GRINDING WHEELS • BUFFING LATHES

"BRIDGEPORT" DEALER REPRESENTATION

NEW ENGLAND
Rudel Machinery Co.
7 So. Main St.
Hartford, Conn., and
Statler Bldg.
Boston 16, Mass.

NEW YORK STATE
Rudel Machinery Co.
100 E. 42d St.
New York City 17

PHILADELPHIA
E. A. Lynch Mach. Co.
Times Medical Bldg.
Ardmore, Pa.

WASHINGTON, D. C.
G. C. Solomone
1426 G St., N. W.
Washington 5, D. C.

VIRGINIA and N. and S. CAROLINA
James McGraw, Inc.
9th & Cary Sts.
Richmond, Va.

CINCINNATI
Brokaw Machinery Co.
426 West 4th St.
Cincinnati, Ohio

CHICAGO
Bryant Mach. & Eng. Co.
400 W. Madison St.
Chicago 6, Ill.

MINNESOTA
Anderson Mach. Tool Co.
2645 University Ave.
St. Paul, Minn.

ST. LOUIS
Blackman & Nuetzel Mach. Co.
3713 Washington Ave.
St. Louis, Mo.

TEXAS
G. F. Cotter Supply Co.
Union Nat. Bank Bldg.
Houston, Tex.

SEATTLE
Star Machinery Co.
Seattle, Wash.

Dawson Machinery Co.
2727 First St., S.
Seattle, Wash.

H. H. Hoffman
568 First St., S.
Seattle, Wash.

SAN DIEGO
P. M. Lockwood Co.
San Diego, Calif.

SOUTH AMERICA
Sabin St. Germain & Assoc.
285 Madison Ave.
New York City 17

GEORGIA
R. S. Armstrong Bros. Co.
676 Marietta St.
Atlanta, Ga.

ALABAMA
Quinn & Quinn
1718 Comer Bldg.
Birmingham 3, Ala.

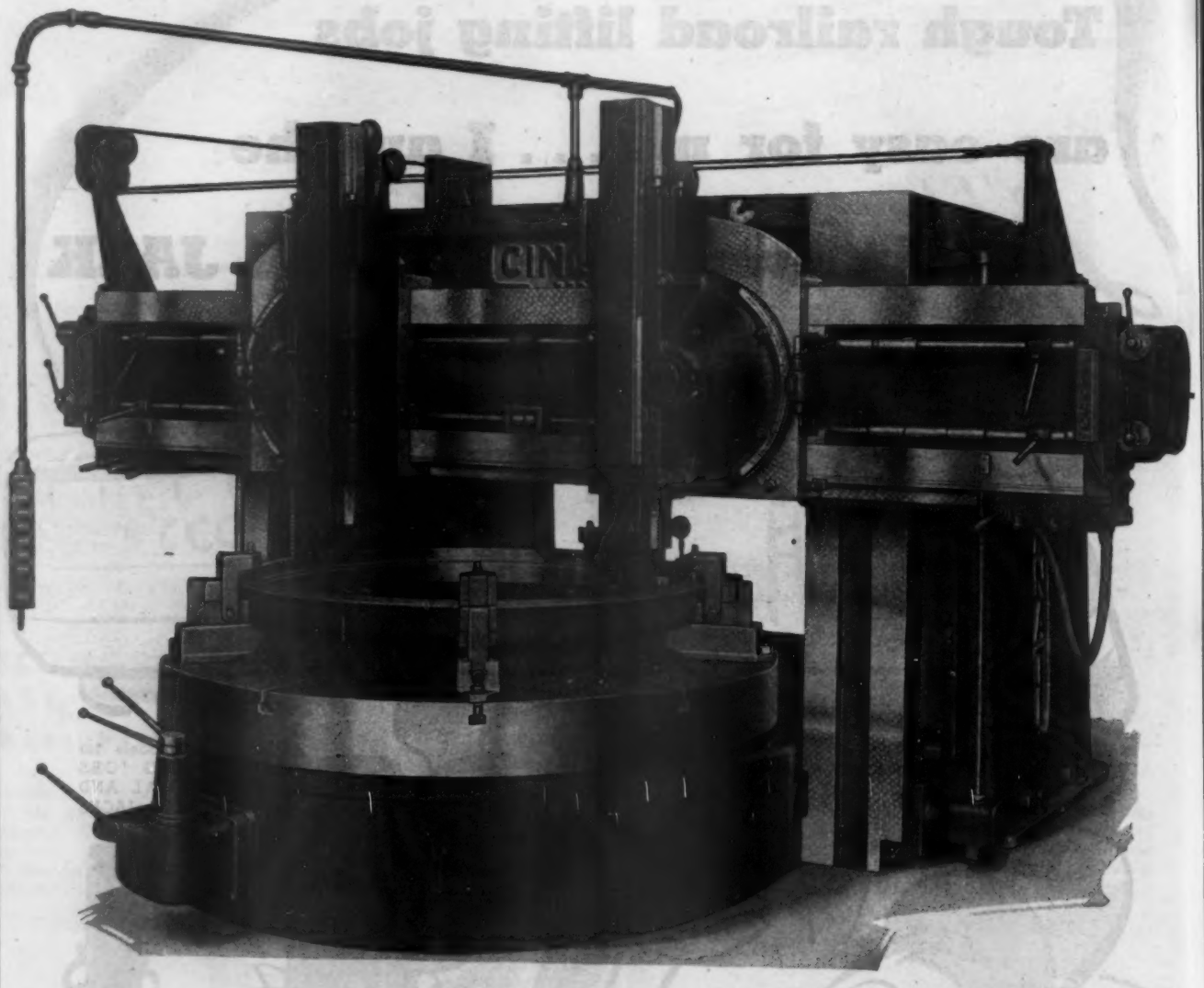
WESTERN NEW YORK
G. W. Brunton & Son
First Nat. Bank Bldg.
Kenmore, N. Y.

PITTSBURGH
Rees Machinery Co.
1016 Empire Bldg.
Pittsburgh 22, Pa.

DETROIT
E. E. Wood Machinery Co.
2832 E. Grand Blvd.
Detroit 11, Mich.

CLEVELAND
S. N. Schenk Co.
Cleveland, Ohio

NEW RAILROAD HYPRO BORING MILL



77" Diameter Tire Rough and Finish Bored in 16 Minutes

★ The new Cincinnati Tire Mill is a HYPRO-duction machine tool designed and built to meet present and future railroad shop demand.

It excels other designs in compactness, rigidity, weight and operating flexibility and includes all the exclusive Hypro features.

Special designed chuck jaws center the tire without distortion. The swinging jaw clamps the tire and holds it in position while machining.

Write for detailed specifications of this high speed Tire Mill.

THE CINCINNATI PLANER COMPANY

Planers...Vertical Boring Mills...Planer Type Millers

CINCINNATI . OHIO . U.S.A.

GET IT!

THE Clark ADJUSTABLE TOOL HOLDER

with all these features:

1. Exclusive vise-grip jaw exerts 4-sided pressure evenly over *full* length of cutter channel, prevents sagging under-channels and broken bits.
2. Bearing surface of the adjustable vise-grip jaw has twice the width and five times the length of the average tool holder, and takes 4 or more sizes of tool bits.
3. Vise-grip jaw clamps large heavy bits or short stub ends with the same rigidity as forged tools.
4. Dual and narrow tool bits are firmly held for cutting-off or special forming operations.
5. Vise-grip securely holds and supports carbide bits, threading tools and boring bars. Protruding underlip prevents breakage.
6. Tilted position of head gives operator unobstructed view of cutting edge.

SPECIFICATIONS		
MODEL	SIZE	CAPACITY
60	0	1/8 to 5/16
61	1	3/16 to 3/8
62	2	1/4 to 1/2
64	4	5/16 to 5/8
With 15° or parallel cutter channel either left or right hand.		

For complete information, call your Clark Cutter Jobber today, or write for catalog RME-I-TH.

Tool Holder P62R gripping Clark Lever-Lock Boring Bar

CLARK CUTTERS

Robert H. Clark Company

9330 SANTA MONICA BOULEVARD BEVERLY HILLS, CALIFORNIA

ADJUSTABLE CUTTING TOOLS FOR ALL MATERIALS

BUILT TO PRODUCE MAXIMUM AMOUNT OF WORK WITH MINIMUM EFFORT

RAILROAD shop requirements demand lathes that are designed to stand up under maximum punishment and produce precision production at the lowest possible cost.

These are the reasons why so many railroad shop supervisors prefer *L & S Lathes*—every detail from the bed to the tool post is designed to produce a maximum amount of work with a minimum of effort.

In addition to stress-proof construction some of the many outstanding L & S features are: centralized control, automatic oiling, ample power, rigid mounting, sustained accuracy, simplicity and sturdiness in the gear box.

Whether it is a big heavy axle lathe or a small tool room lathe, you will find all the answers to your production requirements in L & S construction.

ENGINE
AUTOMATIC
TOOL ROOM
OIL COUNTRY
LATHES

THE LODGE & SHIPLEY MACHINE TOOL CO

CINCINNATI, 25, OHIO, U.S.A.

L & S LATHES

LUNKENHEIMER A. A. R. VALVES

Made to A. A. R. specifications, but with inherent quality features of all Lunkenheimer products, these valves provide trouble free, dependable service for locomotives.

Available in a variety of patterns, fullway and plug type, and with special connections for all requirements.

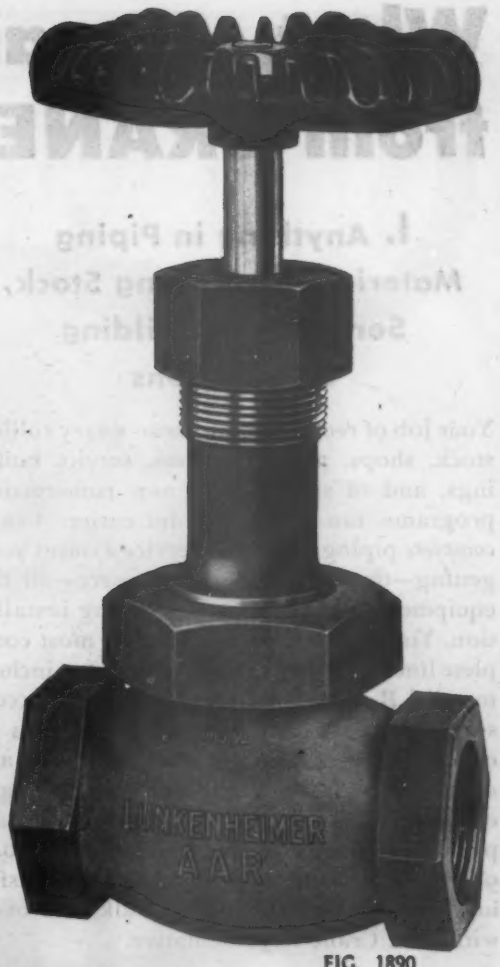


FIG. 1890
Inside Screw

FIG. 1896
Outside Screw

FIG. 1892
Male Inlet
Union Outlet

Lunkenheimer offers a wide variety of products for locomotive and roundhouse service — valves of bronze, iron and steel; cocks, fittings, unions, air nozzles, boiler mountings and lubricating devices.

ESTABLISHED 1862
THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI, OHIO, U. S. A.
NEW YORK CHICAGO
BOSTON PHILADELPHIA
EXPORT DEPT., 318-322 HUDSON ST., NEW YORK

LUNKENHEIMER VALVES

What can railroads get from CRANE?

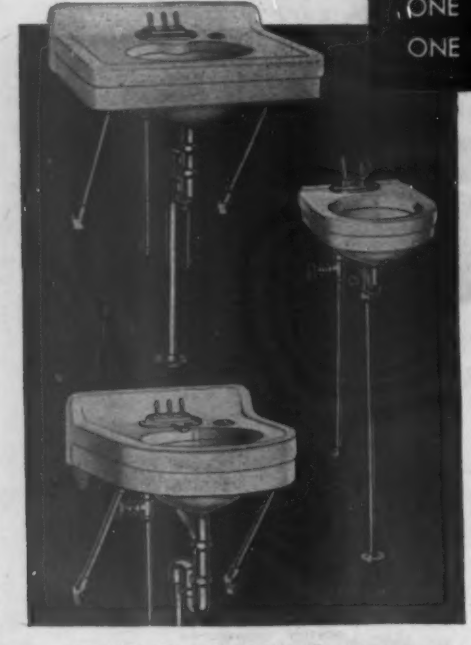
1. Anything in Piping Materials for Rolling Stock, Service and Building Installations

Your job of reconditioning war-weary rolling stock, shops, power stations, service buildings, and of speeding up new construction programs, can be made a lot easier. Crane *complete* piping materials service assures your getting—through one single source—all the equipment you need for any piping installation. You choose from the world's most complete line of quality valves and fittings, including A.A.R. patterns, pipe and piping accessories, in brass, iron, and steel. All steps of ordering, stores-keeping, and installation are simplified by using Crane materials throughout each job. One responsibility covers all parts and you get full benefit of Crane Co.'s 90-year experience and leadership in satisfying industry's piping needs. Talk this over with your Crane Representative.

Steam service piping in Santa Fe's Diesel Locomotive Maintenance Shop

ONE SOURCE OF SUPPLY . . .
ONE STANDARD OF QUALITY . . .
ONE RESPONSIBILITY FOR ALL MATERIALS

Typical Designs in Crane Plumbing for Railroad Service



2. Complete Selections of Plumbing Fixtures for Passenger Cars

To the most discriminating travelers, the name Crane on railroad plumbing fixtures gives assurance of homelike conveniences and comforts. This advantage is available for all your passenger cars—rebuilt and new. The Crane plumbing line includes fixtures in practical designs for all railroad accommodations—each allowing maximum space-saving, but having distinctive features of user appeal. By combining the durable beauty of easy-cleaning vitreous china and operating parts of highest efficiency, Crane plumbing fixtures have won wide preference for railroad service. Ask your Crane Representative about them—for tomorrow's finer train accommodations.

A. A. R. BRASS GLOBE AND ANGLE VALVES

CRANE CO., General Office: 836 S. Michigan Ave., Chicago 5, Ill. • *Branches and Wholesalers Serving All Industrial Areas*

CRANE 90 YEARS OF PROGRESS 1855 1945 **VALVES • FITTINGS • PIPE**
PLUMBING • HEATING • PUMPS

A BEND CAN'T BALK THE JOB

OSTER

no. 300 line

GENERAL PURPOSE THREADING MACHINES

Note the open type vise and revolving die-head which makes bent pipe as easy to thread as straight pipe on the Oster No. 300 Series machines.

No complicated, costly changes of equipment are needed to thread a wide variety of work including long, short, straight, bent pipe, nipples, rods, studs, and bolts.

Lever-operated die-head gives full control of threading-dies. Quick and easy adjustment of chasers for shallow or deep threads is another advantage of the No. 300 Series Die-Head.

Built-in cut-off guides are adjustable for all sizes of pipe within range of each machine. A lathe-type cut-off tool ground with proper cutting angle and clearance cuts pipe off clean and square, leaving no burr. Cut-off tool is fed and oiled automatically and is easily removed for re-sharpening when required.

Three Sizes of "No. 300 Series" Machines

No. 302: Standard pipe range: ¼" to 2". Extra pipe range: ⅛". Standard bolt range: 3/16" to 1½". Extra bolt range: ⅜" to ½".

No. 304: Standard pipe range: 1" to 4". Extra pipe range: ½" and ¾". Standard bolt range: 1⅛" to 2". Extra bolt range: ¾" to 1".

No. 326: Standard pipe range: 1¼" to 6". Extra pipe range: 1". Standard bolt range: 1¾" to 4". Extra bolt range: 1" to 1⅝".

Write for illustrated catalog "LIST NO. 12-A"

THE OSTER MANUFACTURING COMPANY • 2030 EAST 61ST STREET, CLEVELAND 3, OHIO, U. S. A.

THE EDITOR'S DESK

POST-WAR RAILROAD BUYING

Admittedly it is impossible to predict with certainty the extent to which the railroads will purchase equipment, facilities and materials in the post-war years.

Yet, by making a critical study of the buying habits of the railroads over the years; by carefully estimating the amount of deferred maintenance and obsolescence due to the intense operations of war years, coupled with the shortage of manpower and materials; by considering technological developments which have been speeded up by the war; and by studying the possibilities of aggressive competition from other types of carriers, it is possible to make an intelligent approximation of what the expenditures may be on the basis of a reasonable national income.

For many months the editors of the Simmons-Boardman railway publications have been studying these matters. Their findings, with supporting statistics, are incorporated in a 100-page booklet, "The Post-War Railway Market for Manufacturers," for distribution to persons and firms who are specially interested in this subject.

"The reasonable conclusion," says the report, "is that in the immediate post-war years, railway buying from the manufacturing industry should average at a minimum the $1,220 millions expended in 1941, plus perhaps $300 millions or more each year, in addition, until the wartime arrearages in maintenance and capital expenditures are removed."

Following sections on obsolescence and arrears in maintenance of railway plant and equipment, the degree of competition which the railroads must expect, and the prospects for railway passenger traffic, there are detail discussions of the future needs of the different departments for facilities and equipment and tools for their maintenance. An appendix includes a variety of statistical tables and a list of the members of the "Railroad Committee for the Study of Transportation" and its subcommittees.

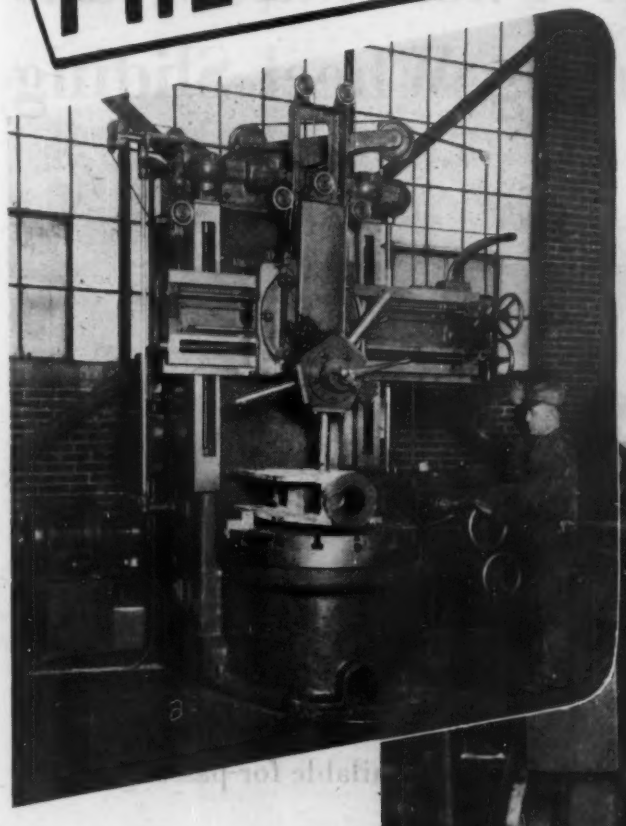
Obviously the distribution of purchases for the various departments will be gaged on the basis of their relative importance in improving the service and reducing the cost of operation. This is a matter for each railroad to decide on the basis of its own peculiar conditions and the ability of the department heads to make a case for their needs.

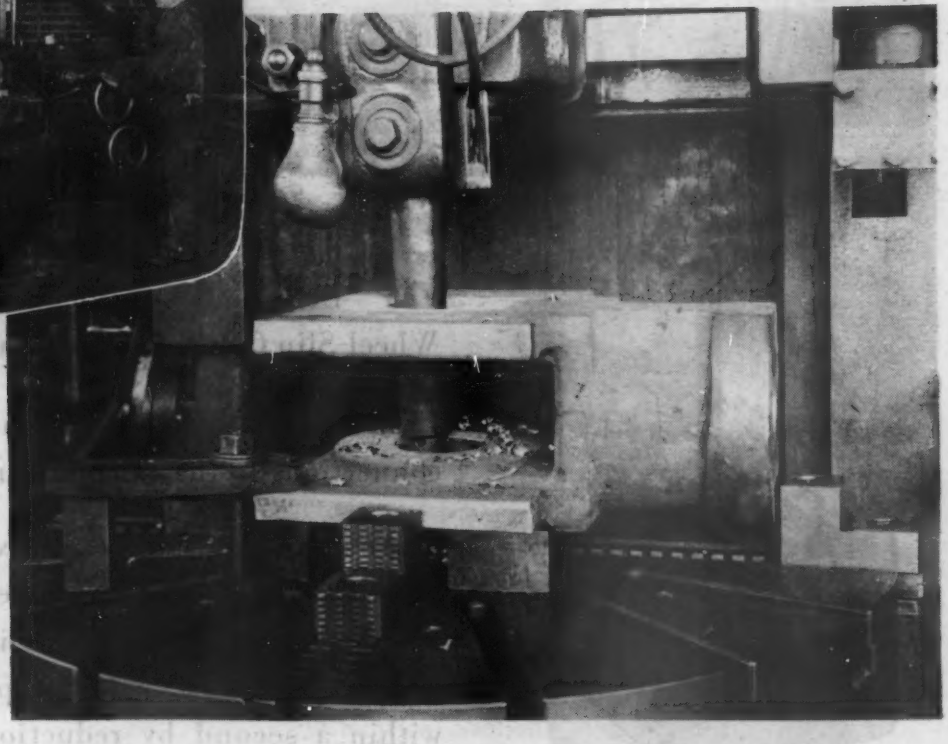
If you can make good use of this manufacturers' booklet and have not yet received a copy, I shall be glad to see that you receive one, if you will address me in care of the Simmons-Boardman Publishing Corporation, 30 Church Street, New York 7.

Roy V. Wright

PRECISION + ECONOMY

The KING WAY ★





ALL KING BORING MILLS are designed throughout for maximum output obtainable from modern high-speed cutting tools.

Precision is another point which has received special attention. Three hardened and ground indexing pins engaging hardened and ground bushings are used in a special arrangement to assure extreme accuracy in alignment and positioning of the turret.

When you chuck a crosshead, piston, packing tub, rod bushing or any other job on a King medium-sized Boring Mill, you do not have to worry about accuracy or the cost of production.

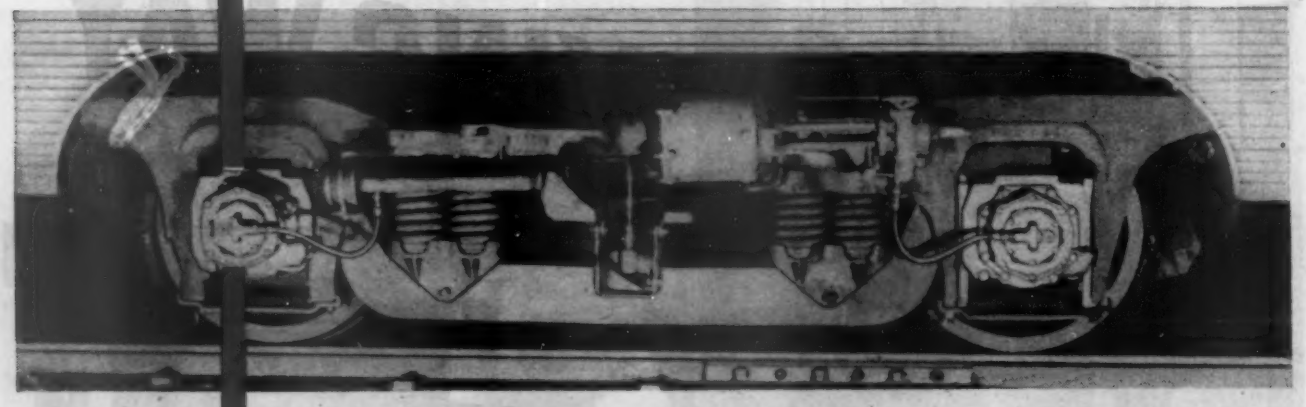
The KING MACHINE TOOL Company

BUILDERS OF VERTICAL BORING AND TURNING MACHINES EXCLUSIVELY

CINCINNATI, OHIO

The "AP" Decelostat Equipment

A Mechanical–Pneumatic Means of Averting Wheel Sliding



"AP" Decelostat Equipment—Mechanical-Pneumatic Wheel Slip Control is now available for passenger cars.

Installation is confined wholly to the truck—no connections to the car body are required.

Driven from the end of the axle, the "AP" Decelostat continuously checks wheel performance at the scene of action and detects the slightest wheel slip when brakes are applied. Wheel slip is detected and arrested within a second by reduction in braking pressure, followed immediately by pressure restoration.

★

SOFTENS THE BRAKE WHEN WHEEL SLIP IMPENDS.

The Decelostat softens the braking force momentarily, permitting the affected wheel to regain train speed.

Westinghouse Air Brake Company

Wilmerding, Pa.

RAILWAY MECHANICAL ENGINEER

(Name Registered, U. S. Patent Office)
With which is incorporated the RAILWAY ELECTRICAL ENGINEER.

Founded in 1832 as the American Rail-Road Journal

***Attention!* 1944 Indexes**

Please send in your request immediately for the index. Copies are sent only to those who write for them. Those who received the 1943 index are already on the mailing list.

Published on the second day of each month by
Simmons-Boardman Publishing Corporation

SAMUEL O. DUNN, *Chairman of Board, Chicago;* HENRY LEE, *President, New York,* ROY V. WRIGHT, *Vice-Pres. and Sec., New York,* FREDERICK H. THOMPSON, *Vice-Pres., Cleveland;* FREDERICK C. KOCH, *Vice-Pres., New York;* ROBERT E. THAYER, *Vice-Pres., New York;* H. A. MORRISON, *Vice-Pres., Chicago;* J. G. LYNE, *Vice-Pres., New York;* H. E. MCCANDLESS, *Vice-Pres., New York;* JOHN T. DEMOTT, *Treas. and Asst. Sec., New York.*

The Railway Mechanical Engineer is a member of the Associated Business Papers (A. B. P.) and the Audit Bureau of Circulations (A. B. C.), and is indexed by the Industrial Arts Index and also by the Engineering Index Service. PRINTED IN U. S. A.

1309 Noble street, Philadelphia, Pa. Editorial and Executive Offices: 30 Church street, New York 7, and 105 West Adams street, Chicago 3. Branch offices: Terminal Tower, Cleveland 13; 1081 National Press bldg., Washington 4, D. C.; 1038 Henry bldg., Seattle 1, Wash.; 300 Montgomery street, Room 805-806, San Francisco 4, Calif.; 560 W. Sixth street, Los Angeles 14, Calif.

Subscriptions, payable in advance and postage free, United States, U. S. possessions and Canada; 1 year, $3; 2 years, $5. Foreign countries: 1 year, $4; 2 years, $7. Single copies, 35 cents. Address H. E. McCandless, circulation manager, 30 Church street, New York 7.

JANUARY, 1945

Volume 119 *No. 1*

Locomotives:

Diesel Repair Facilities 1
Alton Locomotives Modernized 15

General:

Past-Chairman, Mechanical Division Otis Alpha Garber 7
A Scrappy Job (A Walt Wyre Story) 12

Car:

Waste Grabs and Hot Boxes 19

Editorials:

Electrical Potentials 21
Mechanical Division Research During 1944 21
Broad Appraisal of Motive Power Needed 22
New Books 23

Car Foremen and Inspectors:

Wreck Train Equipment 24
Tank Car Repairs 26
Brake Beam Assembler and Tester 27
Pneumatic Journal Jack 28

Back Shop and Enginehouse:

Servicing on Through Runs 29
Chemical Treatment of Diesel Engine Cooling Water 31
Locomotive Boiler Questions and Answers 32
Welded Construction of Locomotive Wheel Centers 33

Electrical Section:

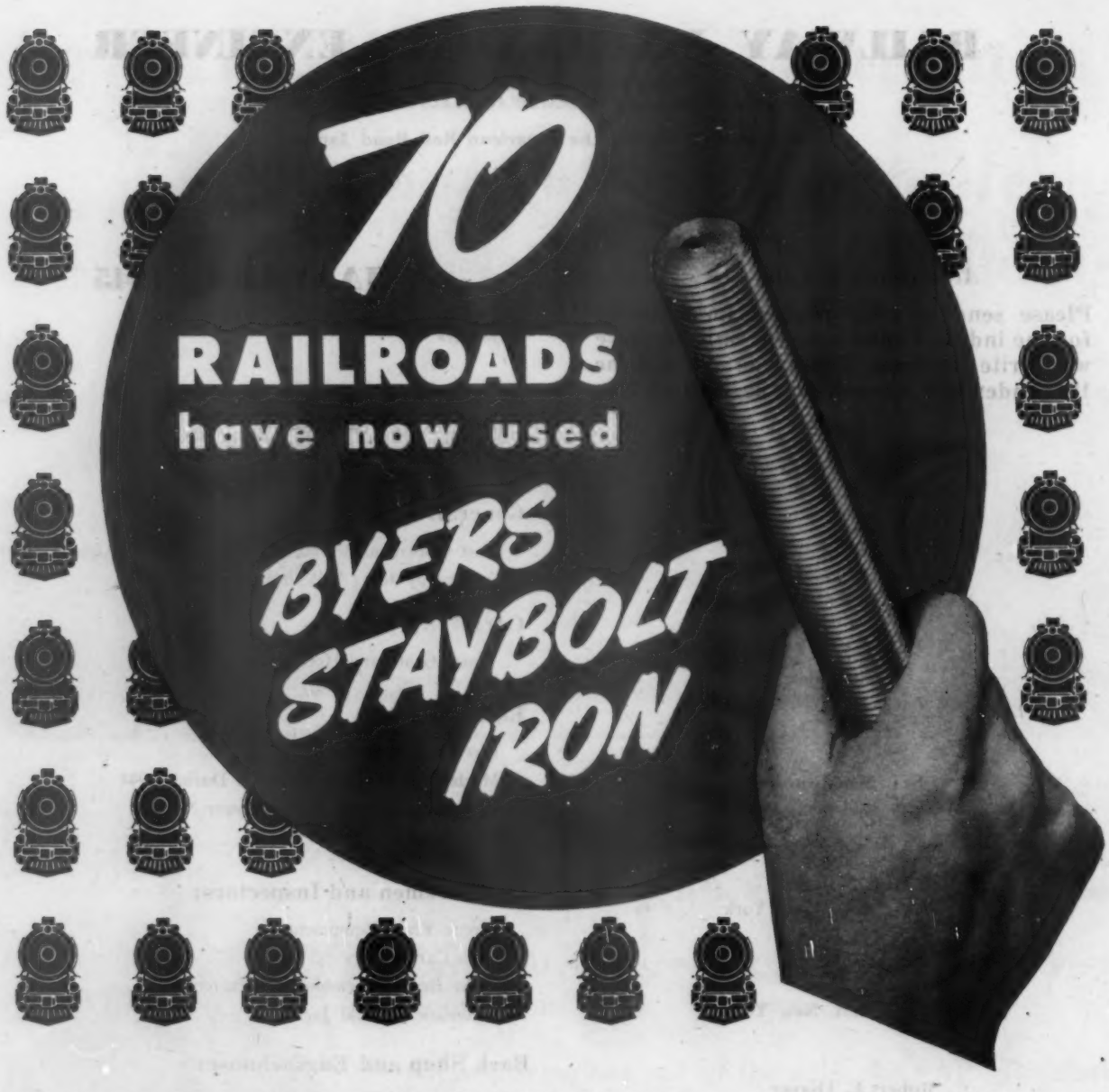
Heating and Air Conditioning 34
In-Place Dipping and Baking 36
Magnet Sweeps Shop Streets 37
Train Communication Progress 38
Sodium Lights Reduce Accidents 40
Consulting Department 41

New Devices:

110-Amp. Circuit Breaker 42
Power Supply For Passenger Cars 42
Metal Cutting Saw 42
Long, Thin Fluorescent Lamps 42

News 43

Index to Advertisers ..... (Adv. Section) 146



It isn't often that you can buy the highest quality at lowest cost . . . but that's exactly what happens when you order Byers Staybolt Iron. Byers Staybolt Iron is the finest wrought iron that man can produce and money can buy. The fact that it has now been used on 70 railroads is the best possible guarantee of its serviceability. And the savings, which in many reported instances run as high as $60.00 a ton, make an impressive total.

The lower cost of Byers Staybolt Iron is made possible by the efficient production methods used. The quality of the material comes from continuous control of every step in manufacture, and tremendous reductions. All material is twice piled, with full length slabs. Blooms with an original cross section of 57,600 square inches are rolled and combined, and finally reduced to a section of less than 1-square inch. This procedure gives more uniform slag distribution than is obtainable by any other means.

A good index to the uniformity of Byers Staybolt Iron is provided by the experience of a large staybolt manufacturer. In fabricating over 500,000 pounds of Byers Staybolt Iron, less than .6% was rejected for quality reasons.

Byers Staybolt Iron conforms to all requirements of AAR and ASTM specifications. It is available through your staybolt manufacturer, or for use in your own shops.

A. M. Byers Co., Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Chicago, St. Louis, Houston, Seattle, San Francisco.

FORGING BILLETS. The same unusually high quality and uniformity found in Byers Staybolt Iron is duplicated in Byers Forging Billets—also at a material saving. They are produced in round, square or rectangular sections, under ASTM-A-73 and AAR-M-307 Specifications.

CORROSION COSTS YOU MORE THAN WROUGHT IRON

BYERS
GENUINE WROUGHT IRON
TUBULAR AND HOT ROLLED PRODUCTS
ELECTRIC FURNACE ALLOY STEELS • OPEN HEARTH ALLOY STEELS
CARBON STEEL TUBULAR PRODUCTS

RAILWAY
MECHANICAL ENGINEER

Diesel Repair Facilities*

By P. H. Hatch†

The character of repair shops for railroads operating this type of power depends on the number and type of units and the road's maintenance policy

ORIGINALLY, Diesel-electric locomotives were purchased and applied to railroad work more or less as individual units and not as classes of motive power superseding the existing types. Hence their servicing, inspection and repairs were on a special basis and handled by special crews. Reliance in large degree was placed on the manufacturers as to methods, tools and materials to be used as well as for general supervision. The entire application had an experimental air about it so that such items as permanent organizations, adequate stores, effective facilities, etc., were given little attention beyond the requirements for day-by-day operation. Such things as long-term maintenance programs and backshop repairs or overhauls were hardly considered. In short, the new locomotives were superimposed on the existing motive power picture and left to prove their worth. They were fortunate indeed if they arrived on a railroad having had experience with gas-electric rail cars or electric locomotives, particularly the latter, since basically Diesel-electric locomotives are electric locomotives with self-contained power plants.

This state of affairs lasted only during the early stages of Diesel-electric application. As soon as any railroad acquired an appreciable number of Diesel-electric locomotives, the necessities of servicing and maintenance facilities became important for the very sufficient reason that the railroad could not afford to waste valuable service hours which could be saved by an investment in such facilities.

To cite an example, it was no longer economical to have a fleet of Diesel switchers meet highway tank wagons for fueling, though this could be tolerated when necessary where one or two locomotives were involved. Terminal fuel and associated facilities were required and were quickly installed.

Locomotive Terminals

Regarding facilities for running and backshop repairs, much the same situation prevailed. At first, existing facilities, whether suitable or not for Diesel-electric locomotives were used with the addition of the bare necessities. Then as additional units of this type were purchased, it become necessary to furnish efficient means for maintaining the locomotives as Diesel-electric locomotives and not as adjuncts of other types of equipment.

The following, therefore, outlines the more important items of facilities and methods used for maintaining Diesel-electric locomotives at locomotive terminals and at backshops. There are two classes of work to be done at locomotive terminals. One is routine servicing, the other is regular or periodic attention. Included in the first is fueling, watering, sanding, addition of lubrication oil, I. C. C. daily inspection and general check of condition of Diesel-engine or engines, electrical equipment, mechanical parts, air brakes, safety appliances, etc., all of which is necessary to release the locomotive for its next run in road service or tour of duty in switching service. Included in the second is periodic inspection and maintenance, I. C. C. monthly and annual inspections, and all repairs or replacements of parts required as the result of continued operation or failures in service.

The principal facilities required for routine servicing consist of fuel oil storage and disbursing equipment, water filling connections, sand towers, lubricating-oil storage, heating and disbursing equipment, source of steam for keeping locomotives from freezing in winter weather or for thawing purposes, a pit or pits suitably lighted for running-gear and underneath inspection and, last but not least, a shed, house or covered area where this work can be done protected from the weather. This latter provision is, of course, not an absolute requirement but it will go far toward increasing the efficiency of the forces handling locomotives for turnarounds.

Inspection and Maintenance Facilities

The principal facilities required for regular inspection and maintenance include a suitable building accessible both by rail and street or highway, tracks with deep, well-drained and well-lighted pits, traveling crane, jib cranes, drop table, locomotive hoist or high-speed power jacks for trucks and wheel changes, wheel lathe, wheel press, small machine shop including toolroom and containing such items as lathe, drill press, milling machine, grinding wheel, cylinder-head valve seat and valve grinder, etc., electrical repair room including simple electrical testing equipment as, for example, high potential test outfit, Megger tester, ohmmeter, bell box, etc., combined air-brake and piping room including facilities for air-brake apparatus testing and repair, also nozzle or injector testing outfit and means for mounting and driving Diesel-engine governors for adjustment, simple sheet-metal tools and

† General mechanical superintendent, New York, New Haven Hartford, New Haven, Conn.

* This is the first of three articles dscussing general and running repair facilities for Diesel locomotives. The second and third articles will appear in subsequent issues and will discuss, respectively, engine and mechanical equipment repairs, and electrical repairs.

electric and acetylene welding equipment. Other facilities should possibly include a few items of blacksmith equipment, lubricating-oil reclaiming apparatus, locomotive washing provisions, battery-charging equipment, including charging lines and outlets, ample provision for storing and disbursing spare parts and the usual offices, locker rooms, showers and toilet facilities for the convenience of personnel.

The foregoing is based on the complete facilities required for a large Diesel-electric locomotive terminal, assuming that there is nothing to start with and everything is installed new. In nearly all cases, railroads have available in or around existing terminals or shops more or less of the equipment listed and it is a problem of regrouping or rearranging such items of these facilities as are necessary, or else of sending the locomotives to different nearby points for the work required. While this latter is often the procedure, it is frequently not the most efficient and in many cases money and time might be saved by the installation of a terminal exclusively for Diesel-electric motive power.

Taking up various items one by one, the following general factors should be considered in planning such a terminal:

The Building

It should be well ventilated, arranged to take full advantage of daylight without the glare of direct sunlight, and should be well lighted at night with a minimum of shadow. It must be designed for the headroom required for cranes or hoists and, if at all possible, should have tracks running through it and not stub-ended so equipment does not have to be jockeyed around to accommodate incoming and outgoing moves. The necessary outlets or connections for portable lights, welders, air, etc., should be provided and the interior should be adequately and uniformly heated in winter. If Diesel engines are to be run indoors, suitable roof ventilation or smoke jacks should be installed.

As mentioned previously, track pits should be deep, well drained and well lighted; the depth should be 54 in. to 60 in. from the top of the rail. It is also desirable at least at some tracks to drop the floor level along the pits and run the rails on I beams or wood stringers from 12 in. to 15 in. above the floor to facilitate truck work, changing of brake shoes and general accessibility of the under part of the locomotives at the sides. Incidentally, it is far preferable to have a pit deeper than actually necessary at all times for it is always possible to provide boxes or staging to stand on if required to reach certain parts of the locomotives. A pit which is too shallow is a constant source of annoyance and an invitation to inefficiency.

Hoisting and Lifting Equipment

An overhead crane of moderate capacity is very convenient for lifting items of equipment on the locomotives out through the roof, as for example, cylinder heads, pistons, liners, blowers, super-chargers, compressors, electrical apparatus, etc., but by reason of additional headroom and structural supports required may increase the building cost materially. Probably the best and most economical scheme is a series of jib cranes located in various places throughout the shop. The principal restrictions involved with jib cranes is a limited area of coverage and a limited lifting capacity. This is usually in the neighborhood of three to four tons maximum. A compromise between an overhead crane and a battery of jib cranes might be a floor-controlled monorail hoist.

For the larger job of removing trucks from under locomotives several methods are available. One is overhead cranes and another is a locomotive hoist for lifting the locomotive so either or both trucks can be rolled out. This is usually an expensive installation though it is a time saver if both trucks have to be removed at the some time. In this connection some railroads have converted existing hoists formerly used for steam locomotives so they can be used for Diesel-electric locomotives by removing the cross members and installing special brackets on each side.

A variation of this same method is power-operated jacks with a suitable foundation on which they can be placed to lift the locomotive. This is probably the least expensive method but it is subject to the inherent limitations of jacking and supporting when heavy weights and fairly appreciable heights are involved.

Probably the best all-around arrangement if an entirely new installation is to be made is a drop table large enough to accommodate a complete truck and arranged to serve two or more tracks. This results in maximum flexibility, is comparatively reasonable in cost and does not involve building complications. If desirable, by a suitable cradle arrangement it can be used for removal of a single wheel-and-axle assembly or a wheel-and-axle assembly including a traction motor.

Machine Shop

Aside from the usual quota of machine tools of the type already mentioned the most important single item is a wheel lathe of such size and capacity that it can accommodate a complete wheel, axle, gear and roller-bearing assembly to keep dismantling to a minimum. A wheel press, in addition, will permit changing as well as turning wheels so all of the necessary wheel work may be concentrated at the one point.

Electrical Repair Room

This should consist principally of a clean, dry room with work benches, vises, shelves, etc., for making simple repairs and adjustments to locomotive electrical equipment. Usually the most satisfactory results are obtained by outright replacement of integral items such as reversers, contactors, relays, resistors and small auxiliary motors, but circumstances sometimes necessitate repair of the item involved rather than replacement. In such an event a suitable electrical shop is a requirement. In addition to the conventional testing equipment already noted, it may be found desirable to include a small motor-generator set for furnishing d.c. power at various voltages for relay and regulator testing.

In the event that train-control or cab-signal equipment is used on the locomotive, the necessary maintenance and testing facilities should be added.

Air-Brake and Piping Room

This can combine the usual tools and facilities needed for repairs and testing of air-brake equipment with the few items necessary for steam, air, water and oil line repairs on locomotives. It has been found logical also to include certain specialized Diesel engine accessory repairs with air-brake work so that the air-brake room should also contain facilities for fuel-injection equipment cleaning and testing and for Diesel-engine governor overhaul and testing. It should be emphasized here that repairs to fuel-injection equipment—pumps and nozzles as separate items or combined as injectors, so-called—are not recommended except with special equipment and highly-trained personnel. Usually the manufacturer is in better position to handle anything beyond cleaning and testing of apparatus of this nature.

Sheet Metal, Welding and Blacksmith Facilities

Tools required for sheet-metal repairs are only those necessary for minor repair work on the locomotives, including maintenance of water and oil radiators.

Equipment for electric welding, either in the form of one or more portable welders or a stationary welding set with a number of outlets around the shop is a highly important item for a Diesel-electric locomotive repair point. Equally so are means for acetylene welding and burning and in this case portable outlets are convenient.

As to blacksmith facilities, these can be made as simple as desired since the acetylene torch can be made to do for most bending and straightening of a minor nature such as work on handholes, steps, brackets, clamps, brake-rigging parts, etc.

Several anvils and means for heating such locomotive parts, in many cases, however, may be of considerable assistance.

Lubricating Oil Reclaimer

For Diesel-electric operation on any large scale, reclamation of lubricating oils is highly important since it permits reconditioning of Diesel engine crankcase oil to the equivalent of new oil and at a fraction of the cost. The reclaimer thus prevents waste and provides the maximum of utilization of the oil. In connection with the reclaimer a system of storage tanks for new and reclaimed oil with pump and heating provisions should be installed.

Incidentally, a viscosity measuring device for field determination of this important quality of crankcase oil is very useful in ascertaining quickly and easily in advance of a regular laboratory analysis whether the crankcase oil in an engine should be drained immediately or is satisfactory to continue in service until the locomotive is next in the shop.

Washing Machine

Since provision must be made for exterior washing of Diesel-electric locomotives, particularly those used in road service, a washing machine is worth considering if the number of locomotives justifies it. In any event, a location for washing by machine or manual means must be provided with water supply and adequate drainage. In connection with the general subject of washing, means should also be provided for tanks or vats for removing carbon, oil or grease from Diesel engine and locomotive parts.

Battery Charging Equipment

This is necessary to take care of batteries coming in on locomotives which by reason of characteristics of service or failure of locomotive charging equipment are in need of charging. Hence, the facilities at the repair point should be capable of high-rate charging for short periods or low-rate charging for long periods, the former being used to bring back discharged batteries, quickly and the latter to equalize gravity by means of an extended charge.

Storehouse and Stores

As in the case of the main shop building, the location of the storehouse facilities should be accessible for both rail and highway deliveries of shipments and provision should be made for proper and convenient storage of large as well as small parts. There is no single facility which can be provided that will do more to assist generally in efficient repair work on Diesel-electric equipment than a well arranged storehouse with adequate stores.

Two Schools of Thought on General Repairs

There are today two schools of thought concerning the necessity for so-called back shopping of Diesel-electric locomotives, or in other words, for general repairs to this type of motive power. There are those who maintain that by progressive or distributed use of unit replacement during the life of the locomotives, the need for back shopping can be eliminated together with the excess out-of-service time and expense that may be involved in backshop repairs. There are others who believe that an integrated system of general repairs at definite periods is desirable, which points to the need for a backshop program.

While the answer to the question depends primarily on locomotive design and arrangement, and on the policy of the individual railroads, there are certain general factors which apply to either system.

The first and foremost of these is that from time to time in the life of any Diesel-electric locomotive certain apparatus will require major repairs or replacements beyond the normal routine of current maintenance. For example, Diesel engine crankshafts will have to be reconditioned or renewed occasionally and this will require either engine replacement or engine dismantling and rebuilding. Similarly, main generators and traction motors will require dipping and baking at certain intervals, depending on service, also renewal of commutators and rewinding. Most repairs of this nature require special facilities which, on account of their size and expense, are usually concentrated at one or two points on a railroad. Hence, either the locomotives must be moved to these points or else the integral items of equipment must be sent there and others installed in the locomotives where they are customarily maintained which may entail extra forces and equipment.

A second factor is that a railroad may desire to install a Diesel locomotive repair shop at a terminal combining both terminal and general repair facilities. This, of course, depends on the geographical and operating characteristics of the railroad involved.

A third factor is the extent to which some railroads already have shops equipped with facilities of the general type required for Diesel-electric locomotives. Cases in point are those railroads which already are maintaining electric locomotives or multiple-unit equipment.

A fourth factor is dependence on the manufacturers for replacement or reconditioning of major items of equipment. Here again geographical and policy considerations apply.

In Event of Extensive Repairs

For that class or repairs, therefore, that are heavier and more extensive than the regular inspection and maintenance and which a railroad desires to undertake without particular reliance on the manufacturers, there are two choices available:

(a) Start out new and install the necessary plant and equipment in which case the shop and facilities described under the heading "Locomotive Terminals" need only be enlarged to the extent necessary to include the additional tools and equipment;

(b) Equip existing shop or shops to handle the work by installing what additional tools and equipment are not already available.

Lifting Facilities for the General Repair Shop

In the following such *additional* tools and equipment will be briefly described and comments included as to their application under either alternate.

For better flexibility in use of shop space, overhead cranes for lifting and moving locomotive cabs are desirable though, if the number of locomotives involved is small, a locomotive hoist or a drop table can be made to serve. In the case of the new shop, the addition of overhead cranes would eliminate the necessity for other means for handling truck removals and would, in addition, provide for lifting out Diesel engines or Diesel engine generator sets. As for existing shops, these are usually equipped with overhead cranes and nothing additional would be required.

While on the subject of lifting apparatus, the liberal use of jib cranes strategically located throughout the shop area is recommended to take care of various classes of work requiring more or less continual light lifting attention in order to avoid tying up the main traveling cranes on small jobs. This has already been mentioned in connection with the new shop and existing shops can and should be similarly equipped if Diesel-electric work is to be added.

Presumably the new shop would be constructed solely for the use of Diesel-electric locomotives, in which case the Diesel engine work can be located where most convenient. In the case of existing shops, however, selecting the location for Diesel engine repair work presents a real and a very important problem, particularly if steam locomotive or car repairs must also be handled, for cleanliness and freedom from dust, dirt, chips, smoke, steam, etc., is an absolute requirement for Diesel engine repairs if the best results are to be obtained. It takes no imagination to picture the consequences of subjecting highly polished surfaces or parts operating with clearances as small as half a thousandth of an inch to liberal doses of dust or moisture. Hence every consideration should be given to complete segregation of Diesel engine work, so far as possible, from the rest of the shop.

Machine Tools Needed

Machine tool equipment for either new or existing shops should be equipped with the small items already mentioned for the terminal repair shop, including a wheel lathe, a wheel press and a lathe large enough to handle axles, in order to take care of all wheel, axle and gear work at the one point. This would be additional equipment for the new shop, but in all probability in existing shops would be already available as would other desirable though not necessarily required items of heavy machinery.

Depending entirely on the number of locomotives to be maintained and the extent to which repairs of a fundamental nature are to be undertaken, a crankshaft grinding machine and a heavy-duty cylinder-liner honing machine or grinder may be required. At the present time, however, it is generally felt that a machine large enough to grind crankshaft journals and pins is more in the manufacturers' province if only on account of the large investment required and the relatively small volume of work. In this connection, a small grinding machine for armature shafts, water pump shafts, etc., would very probably be worth serious consideration. As to the honing machine or grinder for cylinder liners, this might be desirable for reconditioning work if warranted by volume. It is apparent that special items of this nature would have to be considered for either new or old shops since it is unlikely that the latter would include them.

Facilities for Electrical Repairs

Unless a railroad is already maintaining electric traction equipment, the facilities for heavy electrical repairs must be considered in relation to either new or existing shop and in relation to the manufacturers, since in this case also the investment involved is large and requires volume of work for its justification. Assuming, however, that it is desired to become more or less self-sustaining the following will be needed in addition to the smaller items already listed for the terminal repair points: a banding lathe for replacing loose bands on general or traction-motor armatures and for banding rewound armatures is a requirement. Usually the necessary wire-band reels and tension-applying apparatus can be installed on an existing lathe. Also a lathe with a fixture for commutator slotting is desirable if this operation is to be handled conveniently and quickly.

A dipping tank for generator and traction-motor armatures and fields with accurately controlled heating equipment for maintaining insulating varnish in the desired temperature range should be installed. A dipping tank maintained at atmospheric pressure can be used but better impregnation results if a pressure or vacuum tank is used. Together with the dipping tank is required a baking oven, also with accurate control of temperature for thorough drying of apparatus which has been dipped. Incidentally, such an oven is of great assistance in drying out electrical equipment that has been flooded or has been standing around exposed to moisture.

While a lathe can be utilized for generator commutator turning, modern traction-motor commutators should be spun and ground under operating temperature conditions to obtain longest life. Turning on a lathe can be used in the absence of spinning and grinding equipment but if there is to be any volume of work involved, the latter is definitely recommended.

Dynamic Balancing Machine

Another machine which should receive consideration if modern equipment in large quantity is to be taken care of is a dynamic balancing machine. This is a practical necessity for high-speed equipment and, in addition to its use for armatures of generators and motors, it can be used for balancing various other rotating parts, such as blower rotors, fan runners, pulleys, shafts, etc.

If winding of electrical machinery is to be undertaken then the usual assortment of benches, stands, brazing and soldering apparatus and other items of miscellaneous associated equipment must be provided.

A full quota of power wrenches, pinion pullers, wooden cradles, small ovens for heating pinions and roller-bearing races, etc., is a necessity for any general dismantling of motors and generators in connection with repairs or replacements.

For such items of electrical equipment as contactors, reversers, relays, motors, etc., it is well to discourage local repairs or testing and to depend instead on unit replacements. The headquarters for general repairs, therefore, must be equipped with the necessary facilities for repairing apparatus thus changed out. These are usually relatively simple and consist for the most part of work benches with vises, miscellaneous tools for dismantling and reassembling and simple test equipment to know the required apparatus is in proper working order, adjustment or calibration.

If welding of Diesel-engine cylinder heads or other parts is to be attempted, either on account of wear of cracks developing in service, then an oil- or gas-fired furnace with pyrometer control is very desirable because the success of the welding depends in large degree on uniformity of heating and careful control of temperature.

Welding and Metal Spraying Equipment Needed

Another maintenance tool of increasing use is a metal spraying outfit for building up worn surfaces of shafts

or other parts where a mechanical bonding of the added material to the parent stock is sufficient and where welding cannot be used.

Still another item of potential maintenance value for certain locomotive parts is flame-hardening of wearing surfaces with control of flame and timing. It goes without saying that the preheating furnace, metal-spraying outfit and flame-hardening facilities can be added to the blacksmith equipment of the new shop if desired and to existing shops if not already on hand.

Along with the battery-charging equipment already mentioned, a small battery room for making minor repairs to locomotive storage batteries such as cleaning, transferring elements, re-traying, adjusting of gravity, etc., together with means for charging and discharging at various rates and for maintaining spare batteries in a fully charged condition, should be provided for a new shop and is usually to be found in existing shops of any size. Repairs to batteries beyond the capabilities of facilities such as these it is believed are as a rule best handled by the battery manufacturers at their own plants or service stations.

At definite though rather extended periods, it is necessary to repaint locomotives, and facilities for this are generally available in the larger existing shops. In installing a new shop, however, provision should be made for at least a small paint and glazing room and possibly a booth for the spray painting of complete locomotives. Whether or not the latter is justified is again a question of the number of locomotives involved.

In existing shops carpenter and upholstering facilities are usually available and in setting up a new shop simple tools and supplies for repair work of this nature should be included, probably in combination with other facilities of special or intermittent use.

Testing Facilities Should Be Provided

Finally, in the case of either a new or existing shop for general repairs, testing facilities should be provided in the way of Diesel-engine exhaust-gas pyrometer, maximum pressure indicator, tachometer, rheostate (either water or resistor type) for artificial power-plant loading, electric meters, etc.

From the foregoing it can be seen that for Diesel-electric locomotive maintenance a terminal shop for handling inspections and running repairs including light periodic work and a general repair shop or so-called "back shop" for handling the heavier periodic work are basically similar. The only difference between the two is the extent to which one shop can handle heavy repairs as compared to the other. Putting it another way, any adequately equipped terminal shop can handle heavy repairs with a minimum of additional equipment and conversely, any existing back shop, particularly if it is fitted for handling repairs on electric rolling stock, can quite easily take on Diesel-electric repairs. The reason for this similarity is, of course, that the motive power equipment of a Diesel-electric locomotive is principally an assembly of relatively small, easily replaced parts.

It is also apparent in the descriptions which have been given that they represent a plant to work to and ultimately to complete but that if necessary the facilities mentioned can be obtained and installed progressively as the number of locomotives increases and their age advances. In nearly all instances railroads have facilties already in existence at various points and until the Diesel-electric headquarters are finally completed and centralized, items of locomotive work of various classifications can be farmed out to such facilities.

Central Repair Points Desirable

In conclusion, however, it should be stated that the quicker a central point or points, depending on the size of the railroad, can be set up for Diesel-electric locomotive repairs, the quicker will the best results in the opertion of such motive power be obtained.

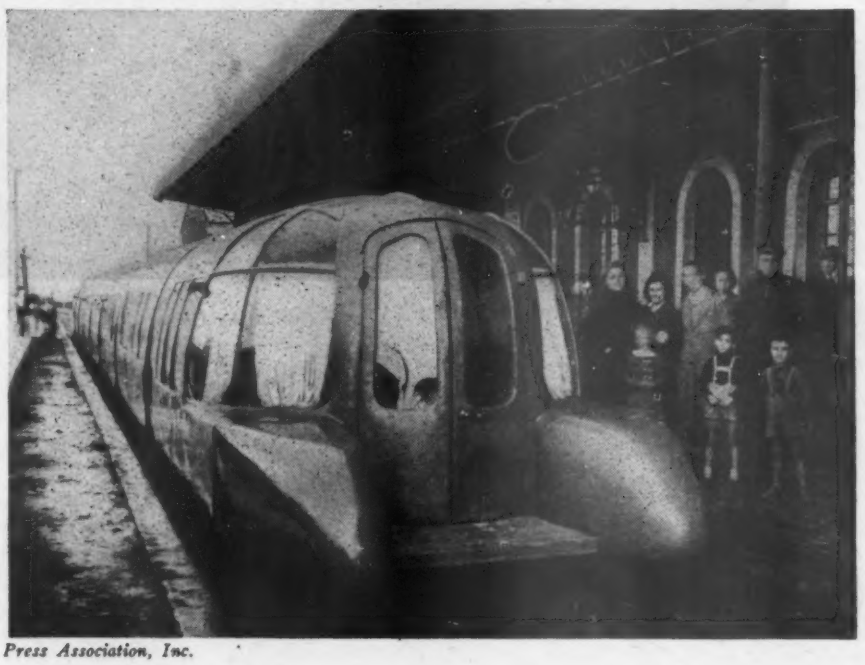
The same conclusion applies with equal force to maintenance material and spare parts for Diesel-electric equipment. Granted that these must be located at points in the territory where the locomotives operate, nevertheless, some central point or points, again depending on the size of the road, for all Diesel-electric stores is very desirable.

This would constitute a supply base for the outside points and in it should be maintained master stock lists and ordering information and a complete supply of all parts in the proper quantities. Also, in cooperation with the maintenance shops and the manufacturers, a system of repair and return can be set up to recondition and reutilize Diesel-engine, locomotive and other parts subject to replacement in service.

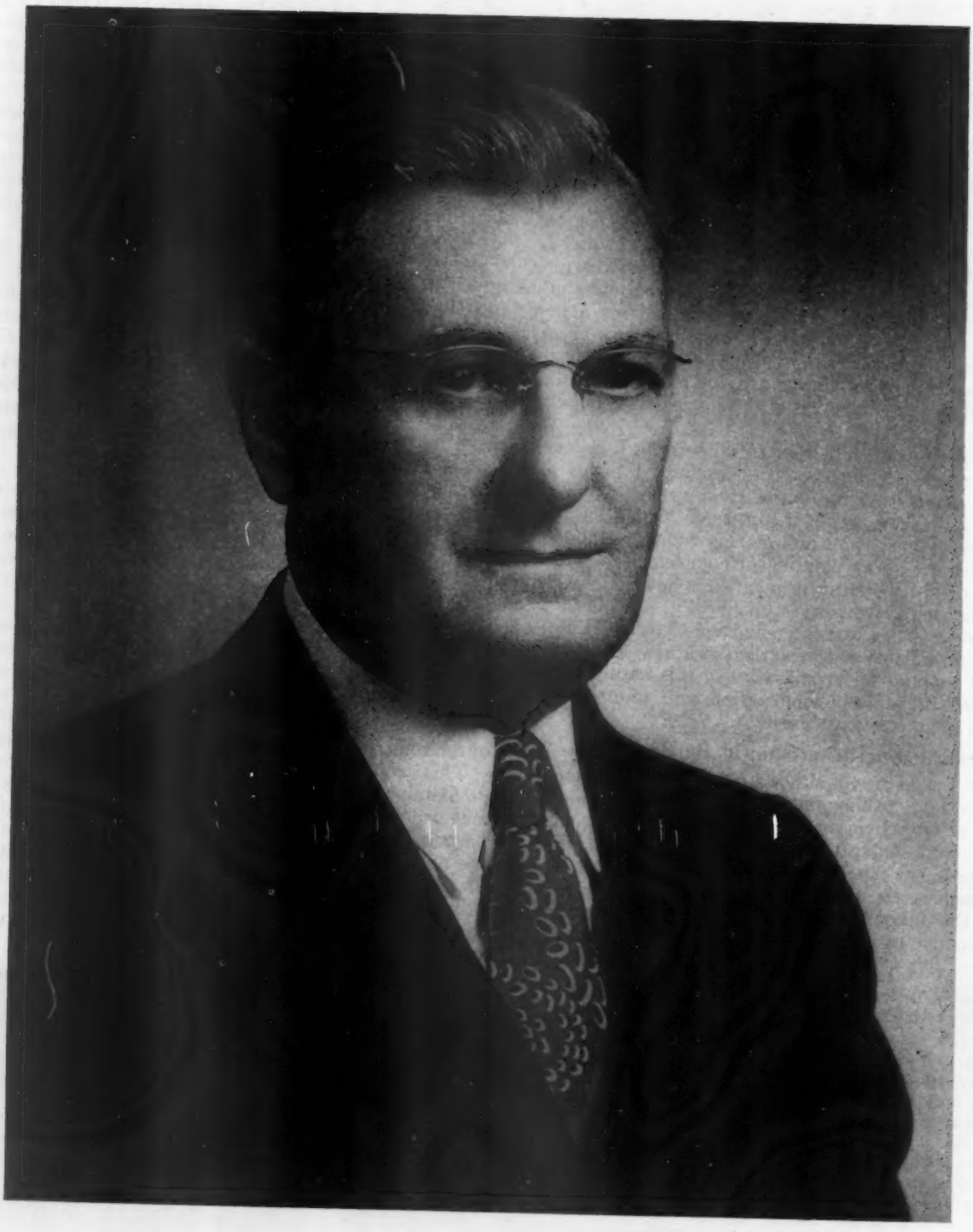
* * *

SPANISH TRAIN WITH LOW CARS WEIGHS 2,850 LB. PER WHEEL.—A streamline Diesel-powered train has been developed in Spain where it is said to have maintained a speed of 80 m.p.h. on sharply curved lines where a regular train could not exceed 31 m.p.h. A reduction in dead weight was effected in part by adapting airplane technique to the building of the carriages, with stressed skin structures and light alloys, and by adapting motor-car technique to the independently sprung wheels, suspensions, and braking systems.

The train is composed of short units, with a very low center of gravity and low overall height above the rails—7 to 8 ft. The car floor has a clearance of only 12 to 14 in. above the rails. The wheels have been made independent by eliminating the axle between each pair. Each car has two wheels at its rear end, each sprung independently from the car body frame. The front end is linked for transaction to the next car body. The train, including passengers, is said to weigh 5,700 lb. per pair of wheels—less than 200 lb. per passenger.



Press Association, Inc.



Otis Alpha Garber

Past-Chairman, Mechanical Division

Otis Alpha Garber

Mechanical department chief of Missouri Pacific Lines noted for rare administrative ability and thorough understanding of technical phases of department

THE Missouri Pacific Lines, including the Gulf Coast Lines and the International-Great Northern, form a sizable railway system on whatever basis it is gaged. With its network of lines in Missouri, Kansas, Arkansas, Louisiana and Texas, it reaches out over their borders into several neighboring states. Serving the three principal transportation gateways on the Mississippi river—St. Louis, Mo., Memphis, Tenn., and New Orleans, La.—its rails extend westward as far as Pueblo, Colo., northward to Omaha, Nebr., and southwest to Laredo and Brownsville, Texas, on the Rio Grande bordering Mexico.

For the year 1943 it ranked seventh among the railroads in this country in operating mileage, eighth in total operating revenues and ninth in maintenance of equipment expenses.

Otis Alpha Garber has served with distinction as its chief mechanical officer since October, 1926—a range of 18 years. He has been a member of the General Committee of the Mechanical Division, A. A. R., since 1928 and was its chairman in 1935-36. He is a member of the Advisory Board of the Locomotive Maintenance Officers Association. What is his background? Where did he get his start in railroading? By what route did he achieve his present position of responsibility and influence? What are some of his outstanding traits and characteristics? The following appraisal is based on the statements of a considerable number of men who have worked with and dealt with him more or less intimately over the years, going back to his school days and railroad shop apprenticeship.

Mr. Garber was born on a farm in Auburn, Sagamon County, Ill., October 15, 1874. His family moved to nearby Springfield when he was about ten years old. He attended high school for two years and according to one of his schoolmates, was a good scholar. Apparently he had a strong desire to earn his own way and after school hours worked in a small store. He spent occasional vacations with his grandfather who had a workshop, and enjoyed greatly working in it with him. From a couple of discarded wheels he made a sulky and then fashioned the harness. As a boy he liked to take clocks and other mechanical devices apart and reassemble them. He seems to have had a natural bent for mechanical details.

Starts His Apprenticeship

As a boy Otis was not particularly interested in railroads. As a matter of fact, he was never in a railroad shop until he started to work as a machinist apprentice in the Springfield shops of the Wabash in 1891. Two of his friends, somewhat older in years, were apprentices and it was possibly only natural that he should follow in their footsteps. He is said to have learned his trade rapidly and incidentally acquired an excellent knowledge of air brakes and their maintenance—a valuable asset at that time.

It is said that while he was working on the air brake bench at Springfield a locomotive, just turned out of the shop, developed a hot main rod bearing. The rod men were called upon to ascertain the cause. They failed to locate the defect and the general foreman sent Otis to see what he could do. As he was looking over the locomotive a wiper known as "Mud Turtle", suggested that he measure the tires. This he did and discovered that one was larger in diameter than the others. The wheels were dropped, the tires re-turned and the trouble eliminated. Otis got the credit and it is said he never forgot the tip given him by "Mud Turtle".

At the End of Ten Years

In summing up his ten years of service on the Wabash it may be said that he learned his trade thoroughly and was regarded as one of the best general mechanics in the shop. Ever on the alert, and giving careful attention to the details of his work, he was at the same time well liked by his associates because of his pleasing personality.

One of his early cronies who has kept in close touch with him through the years remarked recently that "Otis could never stand slovenly work or slip-shod methods. Even when he was laboring night and day mastering the details of shop work he found time to keep neat and clean and was as particular about his appearance as he is today. It's just second nature with him to always be well dressed, just as it is second nature with him to look into shop corners for dirt and rubbish and to rail against what he terms 'bad housekeeping.' "

Apparently the prospects on the Wabash did not appear attractive and in 1901 he left that road to become erecting foreman, and then roundhouse foreman for the Baltimore & Ohio at Lorain, Ohio. On April 4, 1903, he entered the service of the Illinois Central at Paducah, Ky., as a machinist, advancing to gang foreman and then roundhouse foreman. This period marked the beginning of the second phase in his development and experience in the railway mechanical department. The general foreman soon discovered that he was not only an outstanding mechanic, but that his ability, judgment and personality fitted him for a supervisory position.

In April, 1909, he was promoted to general foreman at Mounds, Ill. A friend of some experience suggested that he run the job and resist interference from outside his department. He did just that and later was highly commended by a transportation officer, who said that when Otis came to Mounds, "light, thin and pale-faced," they did not expect to see him last long. To the officer's surprise they soon discovered that he knew his business thoroughly and also understood how to take care of himself in an argument.

In April, 1911, he was transferred to Paducah as general foreman, remaining in that capacity for one year. Here, again, an emergency demonstrated his ability as an organizer and leader. In the 1911 labor difficulties the railroad lost every mechanic and helper at Paducah. Great

responsibility devolved upon the general foreman in recruiting and reorganizing the forces and Mr. Garber gave an excellent account of himself. In March, 1912, he was appointed master mechanic at East St. Louis, Ill.; in October, 1918, he was transferred in a similar capacity to Waterloo, Iowa, and in January, 1919, to Memphis, Tenn.

Goes to Missouri Pacific

Among those who had observed in Mr. Garber up-and-coming tendencies and who knew he possessed the grit, determination and the know-how necessary to successfully carry a heavy load was L. W. Baldwin. After serving as regional director during the period of Federal control, Mr. Baldwin became operating vice-president of the Illinois Central, but in 1923 left to become head of the then not so healthy Missouri Pacific. In 1925 Mr. Garber was invited to join its ranks as mechanical superintendent and first assistant to W. H. Fetner who was chief mechanical officer.

The Missouri Pacific had been hard hit by the shopmen's strike in '22. The morale of its mechanical forces was not high. Efficiency standards were not at a satisfactory level, and its power, rolling stock and shops all pointed the need for modernization and rehabilitation. Some of Mr. Garber's friends urged him to think twice. "Why take a chance?" they asked. "It's a graveyard for good mechanical men. You'll work yourself to death and get no place for your trouble."

To all such advice Mr. Garber turned a deaf ear and a smiling countenance. "Where," he asked, "did you get the idea that I was afraid of hard work or for that matter who says hard work will kill anyone? And what if the property isn't in the best of shape," he added, "it'll be fun to build it up." That it would be built up he had no doubt, for while Mr. Baldwin had been noting things about Mr. Garber that he liked, Mr. Garber had been observing the tactics of Mr. Baldwin. "I figured the Missouri Pacific was on its way up," he explains, "and I knew I'd like working for L. W. B. and time has proved me right on both points."

He went at the task methodically and with his accustomed thoroughness. The first step was to inspire teamwork among the mechanical department supervisors. This he did by working on them, two at a time, until good understandings had been engendered among the entire mechanical supervisory staff and a high standard of cooperation cultivated.

Third Phase of His Career

On October 1, 1926, he was made chief mechanical officer, in which capacity he has functioned ever since. This last period covers the third phase of his railroad career. It will be recalled that in 1922 the railroads, hampered by periodic congestions and still suffering from the McAdoo Railroad Administration, which had functioned during and following the first World War, individually and collectively put on campaigns for increased efficiency and effectiveness of operation. This did much to bring them back into public favor, despite the growing competition on the part of highway and airway carriers.

Mr. Garber, with his natural aptitude and thorough training in mechanical affairs, and his ability to organize and lead men, used these talents to excellent advantage in improving mechanical department efficiency and operation. This was one of the factors that helped the mechanical department of the Missouri Pacific to weather the depression of the 'thirties and to be in a position to give a good account of itself when the Southwest faced into the heavy traffic stress of these war years. His efforts were in no sense dramatic; rather there was a steady, consistent, hard-hitting effort to build up the organization and its morale and induce a maximum cooperation, both within the department and in its relations with other departments.

What about his relations with his associates in supervisory positions and with the workers in the ranks? How did he induce this co-operation and establish that high standard of morale which is characteristic of his department? What about his mechanical ability and the improvements made in the mechanical equipment and facilities during the years that he has headed up the department? The answer to these questions will tell the rest of the story.

Leadership Ability

Having worked his way from the very bottom to the top of the mechanical department he is familiar with all of its details. Not only does he know how to do them, but he has the ability to explain processes clearly and concisely and, if necessary, to demonstrate them. His associates understand this and therefore have confidence in his judgment and leadership. Not only does he know the details of the jobs and how to perform them, but he understands human nature and how to deal with it. That is a combination that makes for real leadership.

If we try to get behind his personality we find his associates emphasizing certain features. He is, for instance, two-fisted, competent and a square shooter; has a saving sense of humor; has a pleasant personality which inspires confidence; is kindly and considerate of others, yet firm, with high moral courage; is tolerant and carries no grudges; is dynamic and colorful; is popular and well liked. It must not be imagined from all this that he is a "softy". Rather, in a sense and in the words of one of his associates, he is a "gentleman of the old school." Not that he is old, even though he is approaching retirement age, for he has a youthful, progressive viewpoint and looks to the future with enthusiasm. But rather, he has that fine courtesy which we associate with the old school, but which at the same time, is coupled with a dignity and firmness, when required, that is respected and cannot be misunderstood.

Just as a successful teacher is patient and tolerant, so Mr. Garber has a keen feeling of responsibility for the development of those under him, and will go the limit in trying to help bring out a man's latent talents. On the other hand, he has no patience for carelessness. "Yes, he is tolerant," commented an associate, "as long as you do not make the same mistake twice."

He encourages men to make suggestions and deals with his associates in cordial friendliness, yet exacts a high standard of performance at all times. Or on occasion this process may be reversed. For instance, he may arrive at a local point and put in an entire morning of criticism, all constructive. At about the time the local officer begins to feel that his stock has dropped way below par, the Chief will say, "Well, Blank, you should be hungry by now. Come down to the Car (business) and have a good dinner." By the time he leaves town the local officer will realize that the Chief was right in his criticisms and will be more than willing to follow his advice.

Different types of men must be approached and handled in different ways. Mr. Garber has the ability to delegate responsibility and make men feel the importance of his responsibility. It may be that a master mechanic, faced by unusual difficulties, has experienced two or three delays in his territory during a 24-hour period. Mr. Garber is quite likely, personally, to call him on the telephone and something like the following conversation may take place.

"Is this you, Tom?"

"Yes, Mr. Garber."

"You are having entirely too damn many delays on your railroad. That's all I have to say."

"Yes, Sir. Good-bye, Mr. Garber."

It is said to be surprising how often this method of approach gets the job done. Those who have worked with him know that there will be no second phone call and that the delays must stop. It is done in such a way, however, that they feel the Chief has confidence in their ability to make good and they tackle the job with renewed confidence and energy.

Mr. Garber has always taken a keen interest in the younger men in his organization and has consistently carried on an apprentice training system through good times and bad. He has accepted the fundamental principle that if you are to have apprentices when you need them in good times, their training must be started four years earlier, even though that is in a period of depression. If, on the other hand, apprentices are graduated during a depression and cannot be absorbed in the organization immediately, they are assisted to get work elsewhere. Such boys, however, are kept track of and are invited back to the railroad at the earliest possible moment when a place can be found for them. It is not surprising that many of the graduate regular apprentices have advanced to important supervisory positions on the Missouri Pacific, as well as on other railroads.

Relations With Workers

Mr. Garber has the record of being open and fair-minded in his dealings with the workers and believes in giving every man every possible opportunity to develop his personality and talents. He recognizes that if we are to continue raising the standards of living, machinery and labor-saving devices must be introduced to take over the laborious manual work, thus multiplying the output of the individual and making production and services more widely available at a lower unit cost. In this way the purchasing value of the dollar is increased.

It is said that a shop mechanic insisted that because of the introduction of improved machinery he was doing two days' work in one, and that this condition was not fair. Mr. Garber's reply was that anything that can be done in a day's time constitutes a day's work.

A labor leader, who has known him for several years and has sat across the table from him in numerous conferences, sizes him up in this fashion: "He is kind and considerate, yet he can cuss you out with the best of them, and when he does you go away feeling that you probably had it coming. His word is good and he hates a liar. He has the complete confidence and respect of his employees and I do not believe there is a man on his railroad who would let him down. That, in a nutshell, is the employees' honest opinion of Otis A. Garber."

Mr. Garber is a strong advocate of safety first principles, mainly from the humanitarian standpoint, but he also recognizes their importance with respect to conservation of manpower. He has unusual sympathy for those in trouble, and invariably is among the first to visit the sick and injured, either in the hospitals or in their homes. He is a bit critical of a doctor who may release an injured shop man with authority to return and perform light work. When will doctors learn there is no such thing in a railroad shop or enginehouse—it is all heavy work!

Dealing With Supervision

Mr. Garber has made a hobby of building up and organizing the employees to carry out their work with a high degree of efficiency. This has brought to the front in supervisory capacities men who might otherwise not have had an opportunity to demonstrate their worth. Incidentally he believes in the practical value of railway mechanical associations and encourages the members of his staff to participate in their activities.

He has taken unusual care in the selection of staff officers, master mechanics, shop superintendents and shop supervisors. While he feels strongly that the master mechanics and shop superintendents should make the selection of the supervisors under them, he requires, before approving such appointments, that the names of more than one man for a position be presented to him, with complete details about their history, education,

Mr. Garber being congratulated by H. E. Roll, personnel manager, when the mechanical department was first to reach 100 per cent in the Fifth War Bond Drive

Mr. Garber watching a World Series baseball game in St. Louis

training and previous experience in a supervisory capacity, and he reserves the right to appoint a second or third choice.

His office door is always open to supervisors and employees to discuss their problems, suggestions, grievances, or what not. One cannot but be impressed with the deep sense of loyalty to him, and through him, to the company, on the part of members of his staff. A former associate, who has taken an important position on another railroad, in commenting on this trait, said with a burst of profanity, that, "If the Chief had asked him to jump over the blacksmith shop he would break his fool neck trying it." Let no one infer, however, that Mr. Garber would make such a request. With his keen and thorough knowledge of mechanical practices and human nature, and his ability and habit to make a quick and accurate analysis of a problem and come to a decision, his requests, though they may be difficult of accomplishment, are eminently practical and purposeful.

And Mr. Garber does have a thorough understanding of the mechanical department and its operations. This was most forcefully demonstrated a few years ago when a Reconstruction Finance Corporation group made a trip over the Missouri Pacific. The representative from Jesse Jones' office, who studied the mechanical department situation, had a rather lengthy list of detail information that he desired. He presented this list to Mr. Garber on the second day of the trip over the road and said: "I realize that this is a long list and involves a lot of work. There is no hurry about it, but at your convenience I would appreciate the information." Mr. Garber looked it over and said he thought he had all the information on the car, with the possible exception of one report which might not be complete for the current month. The R. F. C. representative was rather doubtful if Mr. Garber understood the scope of the information requested. Within a couple of hours complete data requested were presented to this representative, much to his astonishment.

Not only does he keep pertinent information about mechanical department equipment and operations up-to-date and conveniently at hand, but to the occasional embarrassment of some of his associates, he has an uncanny ability of remembering facts and details, and a keen eye for detecting defects in equipment.

Equipment and Plant

The Missouri Pacific has not been in a position to make as heavy capital expenditures for new facilities and equipment as it would have liked. Mr. Garber has lost no opportunities, however, to have studies made of new devices, new methods, or improvements in old ones. In rebuilding and modernizing locomotives, roller bearings have been applied, as well as light-weight reciprocating parts, light-weight pistons with sectional packing, and other devices that seem to have possibilities for more efficient performance. Boiler steam pressures have been increased wherever possible, and the locomotives have been recounterbalanced in order to increase the speed at which they could be operated.

It is not surprising to find that the Missouri Pacific was quick to purchase Diesel equipment for streamline trains, as well as Diesel road freight and switching locomotives. To service and repair the Diesel road freight locomotives a new lay-out has been installed at Dupo, Ill.

While no major back shop has been built in the past twenty years, machine tools and shop facilities have been modernized to a high degree, special efforts being made, also, to eliminate the manual handling of material so far as possible. Each shop, enginehouse or repair track is thoroughly equipped with lift-truck tractors, crane trucks, skid boxes and efficient layouts of runways for moving material in the most economical way.

A characteristic incident that shows Mr. Garber's ability to adopt new ideas is related by a friend. Questioned about a special truck for handling lumber and other materials, Mr. Garber said, "Oh, these are not new. We use them in several places and they sure do a swell job. The first one I ever saw was on a highway in California several years ago, when I was on a vacation. I didn't know what it was and pulled my car to one side to let it pass, but the minute I looked it over I said to myself, 'By golly, that would speed up the handling of material piles, as well as other jobs.' I called to the driver to stop, but he didn't hear me. The place that I had stopped was too narrow to turn, so I had to keep on for a while before I could head back in the direction the lift was going. Finally I caught up with it and flagged the driver to stop. He told me how it worked and what it would do. I climbed over it and got the name of the manufacturer, and wrote to the office to get all the dope on it and the price, so that I could order one when I got back."

At the more important engine terminals the roundhouse stalls have been lengthened, additional long stalls added, and up-to-date machinery and facilities installed for the prompt turning and repairing of locomotives. The major installations of this type are located at St. Louis, Mo., Kansas City, Mo., Omaha, Neb., Ossawatomie, Kan., Atchison, Kan., and one at Dupo, Ill., is now under way.

At Sedalia, Mo., a complete spring shop has been installed in a separate building, with the necessary machinery, furnaces and testing equipment for the efficient repair and manufacture of springs for locomotives and

passenger cars. As a result of improved material used and the method of handling and heat treating, the percentage of spring renewals is very low, compared with what it was before these operations were centralized. A reclamation plant has been installed at Sedalia, which is well equipped to do miscellaneous reclamation work not ordinarily done in other shops. An efficient scrap handling plant is being installed at Sedalia.

Locomotive Failures

A testing organization has been set up to check and inspect materials and test various devices. The installation of water treating plants, with an efficient organization in charge, has resulted in material improvement in the condition of boilers and a decrease in the renewal of firebox and boiler sheets. On fireboxes, for instance, the life of sheets has been more than doubled in the past two decades.

Studies are constantly being made to improve materials or the designs of such parts of locomotives as cause failures. Each failure is thoroughly analyzed. In 1923 there were 2,424 locomotive failures, or an average of 14,121 miles per failure. The peak performance was reached in 1930, with 163 failures, or an average of 225,541 miles per failure. Conditions in 1943 were naturally far different from those in 1930, with the war on, many up-graded mechanics, a shortage of power and the necessity for its quick turning. In that year there were 295 locomotive failures, or an average of 135,327 miles per failure, which, considering present conditions, is an excellent record. Mr. Garber discusses each and every failure with his master mechanics, shop superintendents and staff officers at the monthly meetings.

He believes it is the responsibility of the management to see that every man is thoroughly informed and trained for his task. In addition to the apprentice training and staff meetings for the supervisors, already referred to, the company operates an air brake instruction car and also a fuel conservation car, which has recently been fitted up and which is equipped for the showing of movies with lectures and opportunity for open forum discussions.

The company now operates about 70 Diesel-electric locomotives and the necessary instruction is provided for the training of mechanics working on this equipment and for checking its mechanical condition.

All of the main line passenger equipment is now air-conditioned. Coaches have been modernized to include modern type seats, with attractive lounge rooms, washrooms and smoking compartments. Special emphasis is placed on the thorough cleaning and servicing of passenger-carrying cars at terminals, in order that they may be maintained in a clean, sanitary and attractive condition. Frequent checks are made to insure that this service is maintained at a relatively high standard. The Missouri Pacific has recently ordered 25 aluminum alloy hopper cars of 70-tons capacity.

Helping Friends

The following incident is said to be characteristic of Mr. Garber's interest in his friends and is told in the words of the superintendent of motive power of another railroad:

"When I was made superintendent of motive power, I was only 37 years old. Otis Garber called me the second day after I was appointed and gave me an order to meet him in St. Louis with my bags packed for a two-weeks trip over his railroad. Just being appointed to the position I, of course, did not think I could get away in such a short period of time and spend any time off the railroad before getting organized. Fact of the matter was, Otis won out and I made the trip over his railroad, which he made specially on my account to 'rub my nose' into the executive end of the mechanical department. Over each division he had his key officers accompany us, taking me through all of his shops and storehouses and acquainting me with their shop practices, etc. He even went so far as to hold a meeting with the labor organizations, permitting me to sit in with him to see how he conducted meetings of this nature."

Hobbies and Recreations

Mr. Garber is fond of fishing and hunting, and his occasional trips into Texas have gained him the title of "Big Game Hunter"—he has bagged large game as well as small. Baseball is his real hobby and he follows the fortunes of the Cardinals and Browns with keen zest—yet he seems to get as much enjoyment out of an amateur game on the sandlot, as from the professional games. He is a 32nd degree Mason and a Shriner.

In Conclusion

The story has been told—at least the facts have been assembled and speak for themselves. Linked up with the stories of McCormick, Hankins, Nystrom, Flynn and Henley, it would appear that there is no single, well marked course to the leadership of the mechanical department of a railroad. And yet there are some well defined and outstanding threads in the pattern of the fabric of leadership. These men do have certain traits in common. A keen understanding of human nature, a sympathy for their fellows and the ability to select and develop men of leadership ability, an ample supply of common sense, a thorough training in the details of departmental activities and the ability to analyze a problem and make prompt decisions—these are some of the common qualities which seem to be outstanding.

Mr. Garber presenting safety award to W. B. Shea, shop superintendent at DeSoto, Mo.

A SCRAPPY JOB

by Walt Wyre

THE superintendent of motive power complimented Jim Evans, roundhouse foreman for the S. P. & W. at Plainville, on the job he was doing getting locomotives out, but the official wasn't quite so complimentary when he noticed the pile of scrap that had accumulated.

"I'll be back in three or four weeks," the S. M. P. said, "and I don't want to see even a handful of metal shavings on the scrap dock."

"O.K.," Evans agreed, "I'll try to get it loaded right away if I can get a car set in for loading it."

A car for loading the scrap was set in the following Monday morning. Evans told the operator of the portable gas-electric crane to get a couple of laborers and load the scrap.

"There's a set of rods for the 5094, an air pump to change on the 5097, and a carload of wheels to unload," the crane operator reminded Evans. "Which do you want me to do first?"

"Maybe you can get started loading the scrap first thing tomorrow." The foreman scratched his head thoughtfully and started to walk away.

"You know the gasoline motor on the crane is in pretty bad shape," the crane operator said. "When do you figure on having it fixed? The number two cylinder pumps oil so bad it takes half of my time cleaning spark plugs and the rod bearings are so loose they rattle like a Jap's knees when he sees a Marine."

"Well, we can't tie the crane up now—maybe in a day or two." Evans turned and went into the roundhouse.

Next morning there was a set of driver tires to be handled. Evans told the crane operator to start loading scrap as soon as he finished unloading the tires, but the crane engine changed the program. Half of the tires were unloaded when one of the connecting rod bearings started hammering like a boilermaker in a hot firebox calking a leak.

Evans decided to send the motor to a local shop to have it overhauled as there were no facilities in the railroad shop for doing the work. He found electrician Ned Sparks and machinist Bob Jenkins and told them to remove the power unit from the crane. The manager of the shop told Evans he could have the engine ready to go in a couple of days.

NEXT day the repair shop man called Evans. "The motor you sent down to have overhauled is in pretty bad shape," the repair man said. "The cylinders are worn so much it will take thirty-five thousandths oversize pistons after the cylinders are bored."

"O.K.," Evans said, "go ahead and bore them. Can you have it finished by tomorrow evening?"

"I could if I had the pistons," the repair man said, "but the largest oversize pistons I've got that will fit that motor are twenty-thousandths, and there are none in town. I'll wire Kansas City for some pistons. If they ship them right out they should be here tomorrow and we can finish the motor the next day."

"All right," Evans replied, "get it finished soon as you can. We sure need the crane."

In the meantime, electrician Sparks was overhauling the crane motors and renewing the wiring. The hoist motor particularly needed cleaning, the commutator turned, and some new brushes. Sparks was working on the motor when the foreman came up.

"About finished with the electrical work on the crane?" Evans asked.

"No," Sparks said, "it will take quite a bit longer. I'm figuring on taking the traction motor out and cleaning it good."

"Maybe you had better work overtime tonight and get it all ready. We should get the engine tomorrow," Evans told Sparks.

The engine wasn't ready next day. In fact, it was no nearer finished than it had been the day before. The supply house in Kansas City had wired that no pistons thirty-five thousandths oversize were available for the crane motor.

THAT night Sparks was working on the traction motor when Ed Simpson, the second trick electrician, came into the electric shop all out of breath. Ed had only been with the company about four months. He seemed to be a pretty fair electrician and had had some railroad experience.

"The 5093 has a dead ground in the wiring," Ed said, "and I'm not having any luck finding it. She's a three months' test; they are figuring on running her about eleven o'clock."

"Are you sure the ground is in the wiring?" Sparks asked.

"Yes, pretty certain," Simpson replied. "I disconnected the dynamo and tested."

"O.K.," Sparks agreed. "I'll see what we can find. Is the Megger out there?"

"Yes," Simpson said, and added, "I've disconnected all the cab fixtures and tested them."

"Did you test the wiring in the conduit on top of the cab?" Sparks asked as they walked through the roundhouse.

"No, but I tested the wiring to the headlight and classification lights from the junction box where the conduit from the dynamo connects with the hand rail."

"That eliminates the stack light, too," Sparks said, speaking as much to himself as to Simpson. "Looks like the conduit on top of the cab might be the next best place to look."

The two electricians climbed up on the roof of the cab. Sparks removed the cover from the first condulet in the conduit run and disconnected the wires. He connected one lead of the Megger to one of the wires and grounded the other lead. Simpson cranked the Megger.

"It's not here," Simpson announced.

"Well, it must be somewhere else," Sparks grinned when he realized how silly the observation sounded. "I'll test the wires coming in."

The hand went to zero when the Megger was cranked and Sparks scratched his head. "You' haven't tried the wiring to the back-up light on the tank, have you?" Sparks asked. "The ground could be in that or else in the flexible conduit between the engine and tank. If you'll go down and disconnect there, I'll connect and tape these wires and put the cover on the condulet."

The wiring to the back-up light showed almost a megohm resistance to ground and Sparks was beginning to be more than slightly puzzled.

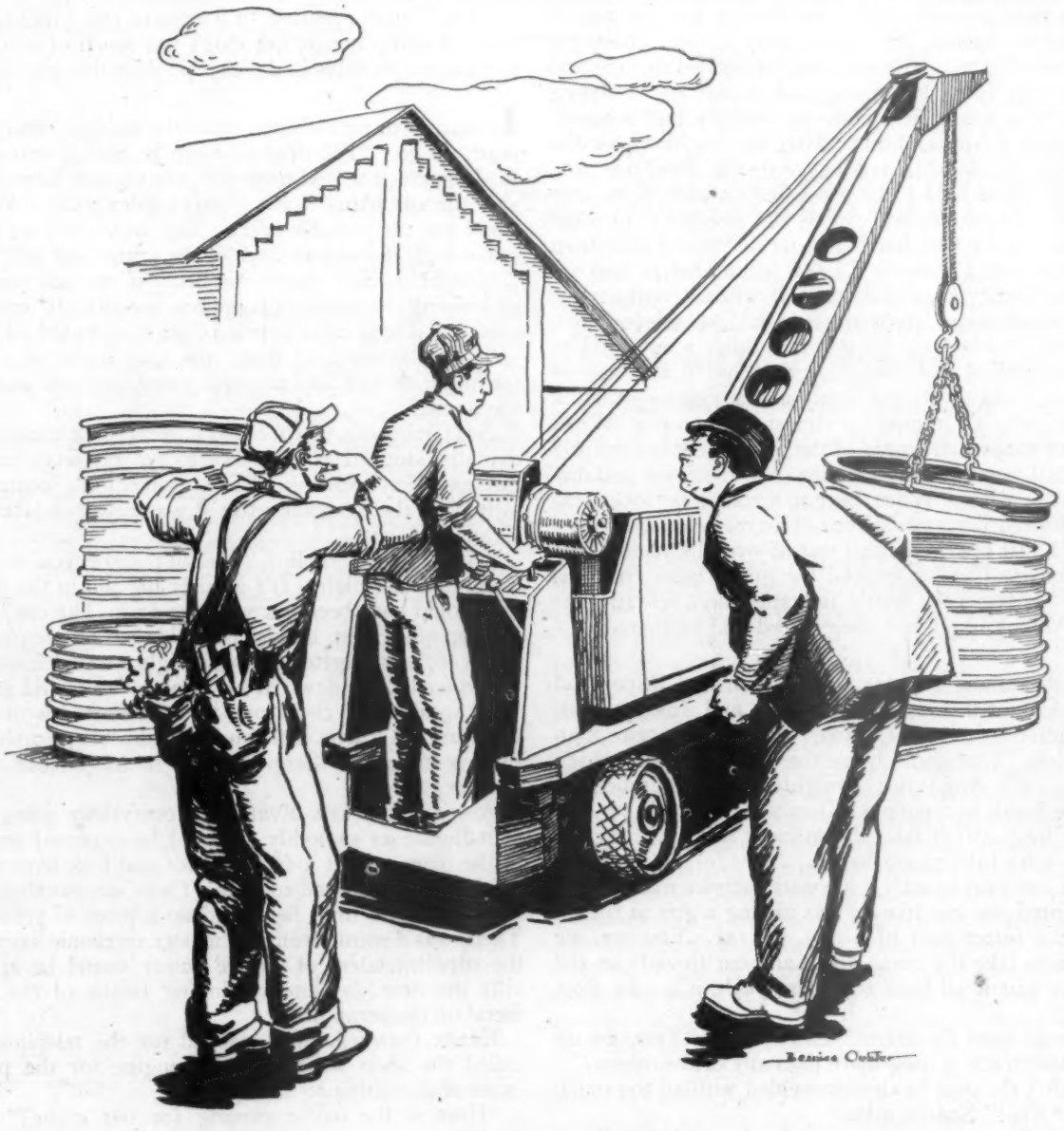
"That's all of it except in the cab. It could be in the wiring to the automatic blow-off. Did you test that?"

"No," Simpson replied.

"Well, guess I should have looked at it," Sparks remarked as he started back to the electric shop.

FIVE days went by and still no pistons for the portable crane motor. Evans had known all along that the crane was a very useful piece of machinery but never before had he realized how many jobs the crane had been used for and it seemed like it was needed more than ever before. There were rods to remove and replace, air pumps to be changed, pistons to pull and replace, driving wheel tires to handle, draw bars to remove, then the pile of scrap was still waiting to be loaded.

Monday morning, one week from the day the crane had quit, one of the electric welders went temperamental.



A connecting rod bearing started hammering like a boilermaker in a hot firebox calking a leak

"Did you disconnect the wires to the panel?"

"No, I figured it all looked too new to be giving trouble, but it could be grounded," Ed said thoughtfully.

"Could be!" Sparks almost yelled. "One side of the circuit is permanently grounded. No wonder we couldn't clear the ground!"

"Now ain't I dumb!" Simpson said. "I knew there was a ground connection in the panel."

"Can't seem to keep the blamed thing regulated and it won't work hardly at all with the positive side grounded," the welder operator explained.

"When did it start doing that way?" Sparks asked.

"Oh, it's been acting sort of crazy three or four days, but it just got so bad today I can't use it."

"Well, if you and your helper will help me pull the

welder to the electric shop I'll see if I can fix it," Sparks said.

"Why don't you get the portable crane to pull it?" Then the welder operator remembered. "O. K., we'll help you get it to the electric shop."

"Looks like a little cleaning and a coat of varnish on the windings wouldn't hurt," Sparks observed when the machine was in the electric shop. "Guess now is as good time as any to do it."

"How long will that take?" the welder operator wanted to know.

"Well," Sparks thought a moment, "if I'm not interrupted with too many other jobs I should get it done today, but I can't promise."

The first thing Sparks did was to test the machine to see if it was grounded. It was. He decided to tear it down before making any more tests to see where the ground was located. The commutator needed turning and the windings needed cleaning and a coat of insulating varnish. The lower field coils particularly had accumulated grease, grime, and dirt. After the machine was disassembled Sparks again Meggered the windings and found the shunt field to be grounded on one of the bottom coils. Vibration had caused the insulation to wear away, leaving the wire bare. The welder would have been ready to go that afternoon if a new hostler helper had not given the hostler a go-ahead signal without removing a fuel oil crane spout from the manhole of a locomotive tank. The result was, to put it mildly, a mess. The crane was pulled over, breaking the pipe at the base of the crane. Fuel oil flowed freely at the rate of nearly a thousand gallons a minute for almost five minutes. Wires leading to the switch on top of the crane were broken and Sparks had to remove the conduit from the crane and disconnect the wires. When he got through he looked as though he had just crawled out of an oil field slush pit.

"And I just put on a clean suit of overalls yesterday!" Sparks moaned as he scraped the gooey mess from his clothes. "If some one would just sprinkle a few feathers on me I'd look like I had been tarred and feathered."

In the meantime, a water service man and helper had come to look at the damaged oil crane and make repairs. "It wouldn't be much of a job," the water service man commented, "if we could braze the pipe. That's all that's damaged. We could just straighten up the crane and braze the break in a couple of hours."

"How long will it take if you can't weld it?" Evans, who had joined the group, asked.

"Oh, I can't say exactly," the water service man paused and squinted one eye like he was aiming a gun at the oil crane, "the better part of a day, I'd say. You see, we will have to take the crane down and cut threads on the pipe, then put it all back together; yeah, it'll take most of a day."

"We sure need the crane," Evans said. "This one on the inbound track is used more than any of the others."

"Couldn't the pipe he electric welded without too much danger of fire?" Sparks asked.

"Yes,"—the water service man slowly nodded his head —"I don't believe there would be much danger. We could clean off around the break and have a water hose handy in case the oil caught fire. This stuff has to get pretty hot before it will burn."

"I'll send a man up to do the welding for you," Evans said. "How long will it be before you are ready?"

"We can have the crane straightened up ready for welding by the time the welder gets here," the water service man said.

"O. K.," Evans said, "I'll send the welder right up. Sparks, you find the portable crane operator—oh, hell, I forgot about the crane being out of commission. We'll just have to get enough men to manhandle the welder."

Evans didn't send a welder to repair the oil crane immediately. When the foreman reached the roundhouse he found all of the welding machines in use except the one in the electric shop.

"How long would it take to get that welder back together?" the foreman asked Sparks.

"Two or three hours," Sparks replied. "It's all finished except putting it together."

"Well," Evans looked at his watch, "it's almost your quitting time now. Go and get a bite to eat and come back and finish the welder. Is there a place to plug in a welder near the oil crane?"

"No," Sparks replied, "I'll have to run wires from the fuel oil pump house, but that's not much of a job. I've got some wire cable in the electric shop that can be used."

It was about nine o'clock when the welding machine was ready to go. "The next problem is getting enough help to drag the machine over the soft ground between here and the oil pump house," the welder said. "We sure could use the portable crane. Say, why can't we run the crane with the welder and let the crane pull it?"

"Might work," Sparks replied, "if we had some way of keeping the welder plugged in enroute. It would take a heck of a long cable to reach from here to the oil crane."

"Never thought of that," the man admitted. "Guess we might as well find a couple more men and start playing horse."

Next morning when Sparks, wearing a clean suit of overalls, stopped at the office to get his work card, the foreman was waiting. "Say, you didn't connect the switch on the oil crane after it was repaired last night," Evans said.

"No," Sparks replied, "I didn't know you wanted it connected last night. It's a fairly big job in the daytime and would have been worse in the dark. The conduit was bent up quite a bit, besides being broken at one place."

"Well, you'd better get on it right away," Evans said.

Sparks looked down at his clean overalls and groaned. They wouldn't be clean long after he started work on the oil crane. His wife had informed him very emphatically that morning that there would be no more clean overalls until next week.

About ten o'clock Evans had everything going in the roundhouse as smoothly as could be expected and went to the office to rest a few minutes and look over the last batch of mail that had come in. There was nothing alarming in the mail until he picked up a piece of yellow clip. There was a memo from the master mechanic saying that the superintendent of motive power would be in Plainville the next day and reminding Evans of the pile of metal on the scrap dock.

Evans frowned, then reached for the telephone. He called the shop where the gas engine for the portable crane was waiting to be repaired.

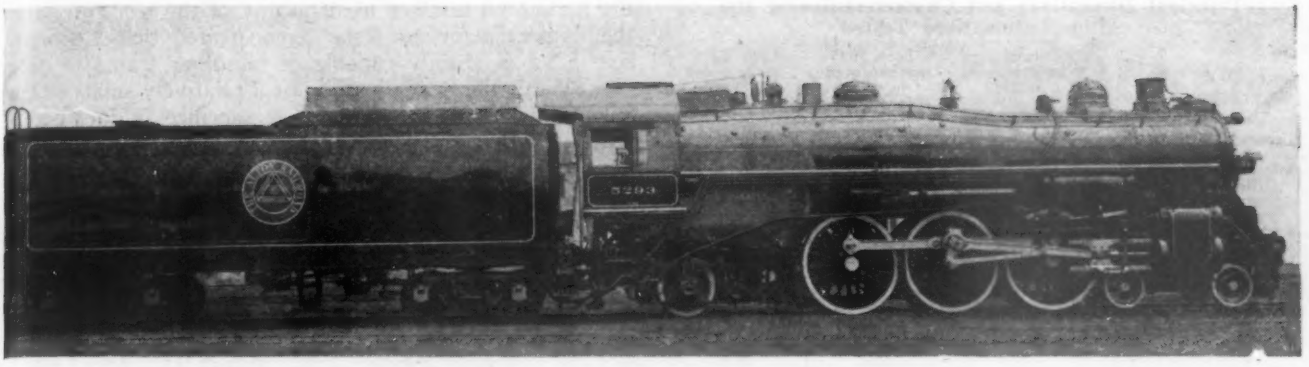
"How is the motor coming for our crane?" Evans asked.

"Still waiting for pistons," the repair shop man replied. "We've been expecting them every day for over a week. They should be here any time now and it won't take long to finish the job when we get the pistons."

"But I need the crane very badly," Evans said.

"Sorry, but I can't help it," the man said. "I've written, phoned, and wired, but it doesn't seem to do any good. If the pistons don't get here today, I'll wire again tomorrow."

(*Continued on page 18*)



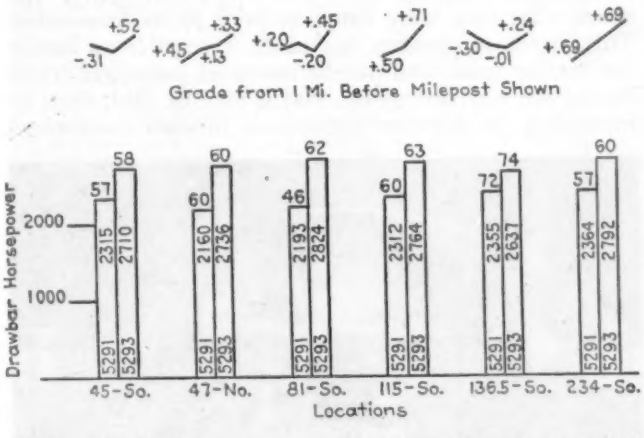
The power output was increased 27 per cent by modernization

Alton Locomotives Modernized

Several betterments applied on ten light Pacific-type locomotives permits hauling three more cars with less fuel

A PROGRAM of improvement to ten light Pacific-type steam locomotives, which the Alton has recently completed, enables this power to make a real contribution in the present emergency to passenger-train handling on this road. Tests indicate that, as a result of increasing the tender size and installing more efficient modern equipment and appliances on these locomotives, the drawbar horsepower has been increased 27.2 per cent and the unit fuel consumption decreased 23.6 per cent. The locomotives are regularly handling three more passenger cars per train than formerly and without any double heading on the fast schedule between Chicago and St. Louis, Mo.

Originally purchased from the American Locomotive Company in 1914, these locomotives were equipped with tenders having a capacity for 10,000 gal. of water and 14 tons of coal and used to haul seven heavy conventional passenger cars on an 8-hr. schedule for the 282-mile daily run between Chicago and St. Louis. In 1939, the need for longer runs between fuel and water stops became so pressing that the tenders were lengthened about 5 ft., increasing the capacity to 13,650 gal. of water and 19 tons of coal. The locomotives were also equipped with Standard stokers and Hulson Tuyere-type grates, the boiler pressure raised from 200 to 220 lb. and the main steam valves reduced from 15 to 12 in. It was found possible to enlarge the exhaust-nozzle tip from 6¼ to 6½ in. At that time, the consist of the Alton trains was increased to 11 cars and the running time shortened to 6½ hr. These trains, however, had to be double-headed over part of the road and in many instances over the entire district between Chicago and St. Louis.



Maximum drawbar horsepowers and speeds at which they were developed

The War Production Board, in freezing all orders for passenger power in 1941, upset the program of the Alton to supplement its supply of modern motive power and, with no new locomotives in sight and an urgent need for added power to handle more and heavier passenger trains, it was decided to see what could be accomplished by further improvement of the old steam locomotives. They were accordingly shopped and equipped with Worthington feedwater heaters, Nicholson Thermic syphons, Type HA superheaters and Dearborn automatic Foameters at an A-and-B cost of $6,635 per locomotive. At this time, the exhaust nozzle was also again increased ¼ in. in diameter, from 6½ to 6¾ in. As modernized, these 30-year old steam locomotives now handle 14 heavy conventional cars, an increase of three, with no double heading and a single locomotive running through between Chicago and St. Louis, daily, on a schedule of 5 hr. 50 min., with five intermediate stops in the 282-mile run.

The Pacific-type locomotives referred to in this article were originally called Class P-16 on the Alton, this designation being changed to Class P-16b for those which were improved in 1939 and Class P-16b (modernized) for those further improved in 1943 and 1944. In order to determine definitely what had been accomplished in connection with the latest improvement program, the management of the Alton arranged to make dynamometer car tests with a Class P-16b locomotive, No. 5291,

Principal Dimensions and Characteristics of the Alton Locomotives Tested

Data	Locomotives as purchased in 1913 Class P-16	Loco. 5291 as improved in 1939 Class P-16b	Loco. 5293 Modernized in 1944 Class P-16b(M)
Type of locomotive	4-6-2	4-6-2	4-6-2
Type of stoker	None	St'd.	St'd.
Engine:			
Cylinders, diam. and stroke, in.	25 x 28	25 x 28	25 x 28
Valve gear type	Walschaert	Walschaert	Walschaert
Valves, diameter, in.	15	12	12
Valve travel, in.	6½	6½	6½
Boiler:			
Working pressure, lb. per sq. in.	200	220	220
Grate area, type and sq. ft.	Table, 70.4	Hulson-Tuyere, 65.4	Hulson-Tuyere, 70.4
Feedwater heater or injector	Injector	Injector	Feedwater heater
Superheater units	Type A	Type A	Type HA
Driving-wheel diameter, in.	77	77	77
Tractive force, lb.	....	42,500	42,500
Heating surfaces, sq. ft.:			
Firebox	240	240	240
Arch tubes, number and sq. ft.	None	4-32	2-16
Syphons, number and sq. ft.	None	None	2-65
Total evaporating surface	3,967	3,999	4,048
Wheel bases, ft.-in.:			
Engine and tender	70-11	75-10	75-10
Weights in working order, lb.:			
On driving wheels	172,417	179,610	179,610
Total engine	277,350	282,150	282,150
Tender			
Axle size, in.	....	6½x12	6½x12
Wheel diameter, in.	....	36	36
Total weight, loaded, lb.	....	249,600	249,600
Loaded weight, front trucks, lb.	....	126,800	126,800
Loaded weight, rear trucks, lb.	....	122,800	122,000
Wheel load per inch of wheel diameter, lb.:			
Front trucks	....	440	440
Rear trucks	....	426	426
Water capacity, gals.	10,000	13,650	13,650
Coal capacity, lb.	28,000	38,240	38,240
Miscellaneous:			
Exhaust nozzle tip, dia., in.	6¼	6½	6¾
Foam meter	No	No	Yes
Theoretical potential cylinder horsepower	2,330	2,390	2,830

against a locomotive of the same class, No. 5293, after it had been fully modernized. These dynamometer car tests, completed on April 9, 1944, comprised 9 test runs made on Alton Limited trains No. 1 and No. 4 of the Alton between Chicago and St. Louis. Data secured on the individual test runs are given in one of the tables. Run 6 was from Chicago to Bloomington, Ill., only.

Results of the test runs are summarized in another table which shows that Locomotive 5293 handled more cars, faster and with less fuel and water after being modernized. For example, the number of pounds of coal per car-mile decreased almost 20 per cent; water evaporation per lb. of coal increased about 11 per cent; drawbar pull increased practically 17 per cent and drawbar horsepower 27.2 per cent; boiler efficiency increased from 52.28 to 60.38 per cent; overall efficiency increased from 3.53 to 4.79; maximum power developed increased from 2,364 to 2,824 hp.

The overall efficiency of Locomotive 5293, 4.79 per cent, is not high even for a modernized steam locomotive, doubtless due to the abnormally heavy trains handled during the test. The test report calls attention to the influence of excessive loads in decreasing locomotive efficiency and states that, with lighter trains, Locomotive 5293 may be expected to show efficiencies up to 6 per cent. The horsepower figures represent the theoretical cylinder horsepower and the tests show that Locomotive 5293 is capable of producing as much horsepower at the drawbar as it formerly developed in the cylinders.

While modernized Class P-16b locomotives are daily hauling 14 cars in the present emergency, 13 cars was the maximum number used on any of the test runs and the dynamometer-car tests demonstrated that Locomotive 5293 is readily capable of handling trains of this size. While the heavy loading of a relatively small steam locomotive may necessitate some sacrifice in fuel economy, if such a train were doubleheaded there would be a much greater fuel consumption by reason of using two locomotives, to say nothing of the increased cost of maintenance for the additional locomotive as well as the wages of the additional crew.

Seven Tons per Trip Fuel Saving

With respect to the coal consumed, it is indicated from the tests that, where Locomotive 5291 would consume an average of 27 tons of coal under present conditions, modernized Locomotive 5293 would handle the same train under identical conditions requiring only 20 tons of coal, or a saving of 7 tons per trip. All coal used was carefully weighed and samples analyzed, considerable variation being found. For example, ash content varied from 14 per cent down to 5 per cent; moisture from 12 to 7 per cent; and B.t.u. per lb. from 12,300 to 10,000.

It is believed that the performance of Locomotive 5293 with the dynamometer car demonstrated conclusively that with 10 or 11 cars under normal operating conditions, it will be possible to eliminate one coal stop which, in turn, will produce additional fuel economy. The tests showed that Locomotive 5293 can be worked when necessary with a substantially longer cut-off than Locomotive 5291 and still maintain full steam pressure and, of course, develop increased power output. An analysis of the four highest drawbar horsepower ratings for each of the southbound and northbound runs for each locomotive shows an overall average maximum drawbar horsepower of 2,739 for Locomotive 5293 and 2,232 average maximum drawbar horsepower for Locomotive 5291, or an increase of 507 drawbar horsepower.

The modernization of the P-16b class locomotives has resulted in this power being able to maintain an on-time performance when handling an increase of three standard weight cars per train on trains No. 1 and 4 over and above what they were handling prior to modernization. This increased capacity has made it possible to handle the heavier train load due to increased passenger travel during the war emergency, and it may be said, that, by increasing the drawbar horsepower of each modernized

Back boiler head of modernized Alton Locomotive No. 5293

locomotive, the railroad has acquired the equivalent of 5,070 additional horsepower or approximately two additional locomotives. However, in normal times when only 10 or 11 cars are being handled, it is reasonable to expect an average saving of 6 to 8 tons of coal per trip between Chicago and St. Louis.

The modernization of the ten P-16b class locomotives has resulted in a fuel saving approximating $100,000 annually, and has also resulted in a material reduction in the number of double-header locomotives formerly used.

In conducting these dynamometer car tests on the Alton, the following general procedure was adopted:

The test crew consisted of three men in the dynamometer car—one operator, one location spotter and one general data man. The test crew on the locomotive included one cab data observer, one coal weigher, one locomotive supervisor, one assistant supervisor and two coal passers.

All instruments used were calibrated before the test and re-checked throughout the tests to insure continued accuracy. It was necessary to eliminate test data involving drawbar-pull calculations on Test 9 on account of the dynamometer going out of adjustment.

Figures for calculation of the average drawbar pull, average horsepower and etc., were obtained by planimetering the drawbar graph from the chronograph chart. Maximum drawbar horsepowers were determined by comparing both locomotive performance at selected locations, the same locations being used for all tests.

All coal was weighed on the locomotive as used, with a special beam scale having a capacity of 400 lb. of coal. To insure accuracy the scale was calibrated before and during the tests. Coal weight figures were recorded in triplicate, by the coal weigher, cab data man and by electrical contact on the scale which recorded each bucket on the dynamometer-car chronograph chart.

The tender tank was calibrated by filling the tank with water and determining the volumetric capacity per inch in depth by running the water out of the tank into 55 gal. barrels. This was further checked by weighing the tender tank empty and full of water and checking the weight of the water against the volumetric determination corrected for temperature. The opposite corners of the tender tank were equipped with hoses and sticks marked in inches. All test water readings were taken simultaneously at opposite corners of the tender tank to insure accuracy. The temperature of the water in the tender tank was determined each time water was taken.

All pertinent data relative to locomotive operation and general conditions were recorded every five minutes by a man in the cab. Drawbar pull, speed and brake appli-

Test Data Secured on Individual Runs with the Dynamometer Car

Engine number	5291		5293		5291		5293		
Train number	4		4		1		1		
Test number	1	3	5	7	2	4	6*	8	9
Date	3-28-44	3-31-44	4-4-44	4-7-44	3-29-44	4-2-44	4-5-44	4-8-44	4-9-44
Number of cars	13	11	12	12	12	12	13	13	13
Lt. wt. of train, tons	1,017.51	842.89	942.59	937.36	937.36	913.13	998.64	1,019.11	1,037.09
Elasped time, hrs.-min.	6-54.8	5.53.5	6-21.8	5-49.0	7-44.0	5-49.0	2-18.8	5-53.0	5-45.5
Running time, hrs.-min.	6-07.6	5-13.7	5-36.4	5-12.0	6-28.2	5-19.9	2-17.2	5-29.9	5-24.9
Delays, min.	47.2	39.8	45.4	37.0	36.2	29.1	1.6	23.1	20.6
Ave. speed, elasped time	40.69	47.73	44.19	48.37	39.72	48.34	55.18	48.03	49.02
Ave. speed, running time	45.88	53.75	50.16	53.83	43.46	52.74	55.53	51.47	52.16
Distance, miles	281.3	281.3	281.3	281.3	282.3	282.3	126.6	282.3	282.3
Number of car miles	3,656.9	3,094.3	3,375.6	3,375.6	3,387.6	3,387.6	1,648.4	3,669.9	3,669.9
Ave. boiler pressure, lb.	206	214	210	213	196	211	213	213	216
Min. boiler pressure, lb.	175	195	170	170	170	187	195	190	203
Ave. steam-chest pressure, lb.	185	196	191	192	176	193	187	186	178
Max. steam-chest pressure, lb.	200	205	210	200	200	205	195	215	205
Ave. back pressure, lb.	10.3	10.3	9.9	12.1	11.1	10.7	12.4	11.6	9.3
Max. back pressure, lb.	19	17	21	17	20	19	20	17	16
Average cut-off, per cent	40	32	46	47.4	40.3	32	52	51.1	48
Minimum cut-off, per cent	25	22	30	30	25	24	40	35	25
Ave. steam temp., deg. F.	596	601	639	648	573	600	643	630	638
Max. steam temp., deg. F.	605	605	680	680	605	610	660	680	700
Coal									
Total coal, lb.	62,027	39,350	47,450	42,350	58,909	44,100	19,500	42,250	38,100
Coal standing, lb.	1,600	500	800	800	400	1,150	none	600	700
Coal running, lb.	60,427	38,850	46,650	41,550	58,509	42,950	19,500	41,650	37,400
Coal lost at pops, lb.	22	16	53	23	11	9	34	142	34
Coal lost at blowoff, lb.	557	573	632	250	540	516	none	113	335
Net coal running, lb.	59,848	38,261	45,965	41,227	57,954	42,425	19,466	41,395	37,931
Coal per car-mile, lb.	16.96	12.72	14.06	12.54	17.38	13.02	11.82	11.51	10.38
B.t.u. per car-mile	175.9	147.8	152.3	140.1	201.4	146.8	135.6	133.3	114.9
Coal per db. hp. hr., lb.	7.55	4.73	4.76	5.15	6.77	6.03	4.65	4.61	6.48
B.t.u. per db. hp. hr.	78.30	65.45	51.55	57.50	78.50	68.07	48.70	53.40	71.90
Coal per hour, lb.	9,861	7,360	8,318	7,991	9,042	8,060	8,430	7,573	6,912
Coal sq. ft. grate per hr., lb.	150.8	113.6	118.2	113.4	138.3	123.2	119.7	107.6	98.2
B.t.u. total coal	643,482	457,195	514,121	472,762	682,548	497,429	229,008	489,174	421,801
B.t.u. net coal running	620,638	444,397	497,860	460,659	671,541	478,656	228,609	479,397	410,189
Ave. b.t.u. coal fired	10,372	11,614	10,831	11,125	11,579	11,256	11,744	11,579	11,077
Water									
Tot. water out of tender, gals.	30,589	25,760	27,527	26,981	32,375	26,873	12,835	27,646	24,304
Manual blowoff, gals.	1,469	1,512	1,054	652	1,436	1,361	0	248	0
Automatic blowoff, gals.	0	0	614	7	0	0	0	50	873
Water loss at pops (Gl)	166	122	39	177	82	60	255	1,077	255
Total water evap., gals.	29,120	24,248	25,859	26,255	30,939	25,506	12,580	27,332	23,431
Total water evap., lb.	242,570	201,986	215,405	218,704	257,722	212,465	104,791	227,676	195,180
Water evap. per lb. coal, lb.	4.05	5.28	4.68	5.30	4.45	5.01	5.37	5.48	5.27
Water evap. lb. coal 10,500 b.t.u.	4.10	4.77	4.54	4.98	4.03	4.66	4.92	4.97	4.99
Factor of evaporation	1.282	1.283	1.285	1.286	1.277	1.283	1.287	1.285	1.284
Eqv. evap. from/at 212 deg. F.	5.19	6.77	6.01	6.82	5.68	6.43	6.91	7.04	6.77
Steam to auxiliaries, lb.	27,227	19,805	22,314	13,106	26,671	22,135	8,915	21,666	14,122
Steam to cylinders, lb.	215,343	182,181	193,091	205,598	231,051	190,330	95,664	206,010	181,088
B.t.u. required for steam for auxiliaries	1,187.1	1,188.1	1,186.8	1,185.5	1,187.0	1,186.9	1,184.2	1,184.5	1,184.1
B.t.u. required for steam for cylinder	1,307.1	1,307.7	1,328.0	1,330.0	1,286.4	1,306.5	1,335.5	1,330.4	1,335.4
Locomotive Performance									
Ave. db. pull, lb.	10,565	9,058	12,854	10,721	11,423	9,377	11,908	11,893	7,593
Ave. db.-hp.	1,293	1,298	1,720	1,539	1,522	1,319	1,763	1,632	1,056
Db.-hp. hours	7,926.1	6,788.5	9,649.2	8,002.8	8,553.3	7,030.3	4,019.6	8,976.0	5,713.0
Steam per db. hp.-hr., lb.	27.18	20.84	20.02	25.68	27.03	27.07	23.80	22.62	31.71
Boiler efficiency, per cent	48.39	57.26	56.10	61.13	48.19	55.28	61.75	61.29	61.39
Overall efficiency, per cent	3.25	3.89	4.94	4.43	3.24	3.73	5.03	4.77	3.54

* Chicago to Bloomington, Ill., only.

General Summary of the Test Results

Item	(A) No. 5291	(B) No. 5293	Ratio Col. B to Col. A minus 100 per cent
Number of cars	12	12.6	5.00
Lightweight of train, tons	927.71	987.35	6.4
Running time, hr.-min.	5-47.35	5-21.8	-7.93
Average speed running time, m.p.h.	48.88	52.21	3.75
Average boiler pressure, lb.	207	213	2.90
Average steam-chest pressure, lb.	187.5	187	-.27
Average exhaust steam pressure, lb.	10.6	11.1	4.80
Average cut-off, per cent	36.1	48.9	35.50
Average steam temperature, deg. F.	592	640	8.10
Average superheat temperature, deg. F.	202	248	22.77
Coal per car-mile, lb.	15.01	12.06	-19.65
Thousand B.t.u. per car-mile	168.0	135.2	-24.30
Coal per drawbar horsepower-hour, lb.	6.27	4.79	-23.60
Thousand B.t.u. per drawbar hp.-hr.	72.58	52.82	-27.20
Coal per sq. ft. grate area per hr., lb.	131.5	111.4	-15.30
Total water evaporated, gals.	27,453	25,719	-6.33
Water per lb. coal, as fired, lb.	4.70	5.22	11.05
Water per lb. of coal (10,500 B.t.u.), lb.	4.39	4.88	11.18
Factor of evaporation	1.282	1.286	.31
Equivalent evaporation	6.02	6.71	11.45
Average drawbar pull, lb.	10,106	11,844	17.15
Average drawbar horsepower	1,308	1,663	27.20
Drawbar horsepower-hours	7,574.5	8,876	17.20
Steam per drawbar hp.-hr., lb.	27.03	23.03	-14.80
Boiler efficiency, per cent	52.28	60.38	15.49
Overall efficiency, per cent	3.53	4.79	35.75
Maximum hp. (mile post 234 southbound)	2364	....	....
Maximum hp. (mile post 81 southbound)	....	2824	....

cations were recorded continuously by automatic pens on the chronograph chart. Locations and other notes including time past stations, mile posts and etc., were recorded on the chart manually.

A general log of all trips was kept covering weather and track conditions and any unusual operating conditions observed. Atmospheric temperature was recorded at four locations on each trip, using a thermometer located outside the test car. Wind conditions were secured from local government weather stations at Chicago, Springfield and St. Louis for the times the train was in that location, but the effects of wind and temperature were not calculated for these tests.

During the tests, an analysis was made of the coal taken each time and there was considerable variation. For example, there were occasions when stored coal was obtained from the terminal at St. Louis and it ran as high as 14 per cent in ash and other coals as low as 5 per cent ash. The moisture content varied from about 12 per cent to 7.5 per cent. At Chicago, the Wilmington coal in some instances ran as high as 12,300 B.t.u., whereas the Ridgely coal was just under 10,000 B.t.u. Fuel consumption was calculated on B.t.u. per drawbar horsepower-hour, because the quality of coal taken throughout the tests varied so greatly.

In calculating the steam consumed by auxiliaries, it was assumed that the air compressors use 25 lb. per min.; headlight generator, 100 lb. per hr.; steam heat, 100 to 200 lb. per hr. per car, dependent upon outside temperature; stoker engine, 1 to 1½ per cent and stoker jets 1 to 2 per cent of boiler output, dependent upon the type of stoker; safety valve, 1,100 lb. per min.

A Scrappy Job

(*Continued from page 14*)

Evans cradled the receiver and walked out to the scrap dock. The more he looked the worse he felt. There was a car spotted and waiting, but one car wouldn't hold the mountain of scrap, it would take two.

He found his available labor force—two house cleaners, one pit cleaner, and the man that cleaned the machine shop—and told them to go to the scrap dock and start loading scrap. It didn't take long to see that the four men wouldn't be able to make even a decent showing by the time the S. M. P. arrived.

Evans thought of calling out the whole force, mechanics, helpers, and all, to load scrap, but that would mean delays to locomotives and after all getting the locomotives out was more important than loading scrap, and he wasn't minimizing the importance of scrap either.

The foreman knew the superintendent of motive power would be hot as a firecracker but there was little that could be done without the crane. In one day two men with the crane would load more scrap than a dozen men could load by hand.

THE job at the fuel oil crane hadn't been quite as messy as Sparks had feared. The water service men had cleaned a good bit of the oil off the crane and Sparks wiped off more. He managed to get the job finished with a few clean spots left on his overalls but his gloves were ready for the trash can. He gathered up his tools and went back to the electric shop. While Evans was stewing around the scrap dock, Sparks, passing by, saw that the foreman was in a sweat and he had a good idea why.

The electrician wiped his tools and laid them on the work bench, then got a piece of waste and some carbon tetrachloride, a very scarce article, and began trying to clean some of the oil from his overalls.

While Sparks was making the more or less successful attempt at dry cleaning, Evans came into the electric shop. The electrician expected Evans to say something about carbon tet being too scarce for such use, but the foreman had other things on his mind.

"Did you finish the oil crane?" Evans asked.

"Yes, it's O. K.," Sparks replied. "Did you want something else done?"

"Nothing special," Evans replied, "unless you can find a motor for the portable crane. That scrap almost has to be loaded before tomorrow noon."

"Afraid I wouldn't know where to get a motor," Sparks said, then when Evans started to leave Sparks had an idea. "Say, I might be able to get the crane going after a fashion."

The foreman turned suddenly. "How?"

"Well, we could hook up an electric welder out by the scrap dock and run the crane with current from the welder. Some one would have to regulate the welder while the crane operator handled the crane controls."

"It's worth trying," Evans said hopefully. "Let's see if it will work."

The crane was pushed out to the scrap dock, but the six men could not start it up the incline.

"Wait, and I'll connect the welder to the crane motor," Sparks said.

Operation was slightly awkward at first. Sparks operated the welder controls to regulate the voltage while the portable crane operator handled his machine. After two unsuccessful attempts the crane pulled itself up the incline to the scrap dock and loading began. In an hour the operators had learned how to work together better and the work went along almost as well as though the crane had its usual power. A laborer on the dock fastened the chain to the scrap and another in the car unhooked and threw the chain back. Another car was set that night and the last scrap loaded before noon.

Evans, very well pleased, looked at the empty dock and went to the office. Two minutes later the phone rang. It was the man in the repair shop uptown. "We got the pistons and the motor will be ready this afternoon," the man said.

He still wonders why Evans swore.

A Journal Bearing that Reduces

Waste Grabs and Hot Boxes

By B. R. Jones*
and
P. J. Hogan†

It is well known that there have been no great changes in the type or style of friction journal bearings for railroad cars and locomotive tenders in the past 80 years, except where slight changes have been made in dimensions to accommodate larger loads and faster train schedules, and in the addition of a soft metal lining. These changes have not solved the problem of preventing waste grabs and, in spite of every precaution, we still have them. For purposes of review, the following is a partial list of some of the causes of hot boxes: waste grab; rolling waste; packing not in contact with the journal; too much packing; packing caked or glazed; boxes improperly packed; insufficient packing; time between periodic packing dates too long; boxes packed too tight; loss of oil through use or leakage; packing too dry; poor quality of packing; wiping on edge of bearing caused by lining spread; wiping by trapped waste in lining grooves; wiping by waste jam at bearing top in box; wiping caused by waste ledge projection in box; improperly saturated waste; improper oils; abrasive matter in packing; defective or broken bearing; improper application of bearing lining to shell; shelled out lining; cracked lining; concentrated pressure due to uneven bearing; wrong bearing size for journal; lining worn out; overload on bearing; improperly finished bearing surface; excessive journal taper; improperly finished journal; truck out of square; bolster guides and columns worn; water or ice in box; top of wedge not having proper bearing in box; distorted or broken wedge; broken journal box; crown of box worn hollow; careless workmanship in assembling trucks; careless handling of journals and lack of protectives; flat, rough and badly worn wheels and wheels out of round; rough track surfaces; rough handling in switching; rough handling in road-haul trains; excessive journal-bearing tilt; excessive journal-bearing roll between box stops; improperly maintained machinery in manufacturing and finishing of axles and bearings; worn or broken dust guards.

Waste Grabs

It has been estimated that at least 70 per cent of all hot boxes result from waste grabs. The large percentage of failures directly chargeable to these grabs led our mechanical department into a campaign to find out just what caused waste grabs and to try to correct the condition before the hot box developed. No practical answer had been obtained up to 1935 to stop waste grabs during ordinary handling of cars.

A careful study of photographs made of action in journal boxes during switching shows the necessity of stopping waste grabs by preventing waste from coming in contact with the journal in the "danger zone," that is at the lower edge of the journal-bearing lining metal and the journal proper. A study shows that there is sometimes a three-way movement of journal bearings relative to a fixed center line of the axle. These movements may be upward which causes a lifting of the bearing off the journal; or, there may be a tilting action; or, a forward or backward movement of the bearing relative to the fixed ends of the car.

In any case it is easily seen that when, for any reason, the bearing is moved from its normal position an aperture is opened which can trap any loose ends of waste that may be near its lower edges. As this opening becomes larger it tends to grab the waste which is then carried between the bearing lining and the journal.

It is a well-known fact that when a new bearing is placed on a journal the surface of the bearing that at first actually carries the load is limited to a fraction of the total bearing surface. This area is usually about one inch wide in the center and extends the entire length of the bearing. This means that there is a larger opening present at this time between the lower edge of the lining metal and the journal surface than exists after the bearing wears in and settles on the journal. This condition is, of course, more pronounced after a journal has been reconditioned because of the smaller turned diameter of the journal.

Attacking the Problem

It was felt that any device used to overcome this grabbing tendency should be simple, have no moving or re-

Example of a waste grab developed after the bearing had raised from the journal at yard-switching impact speed

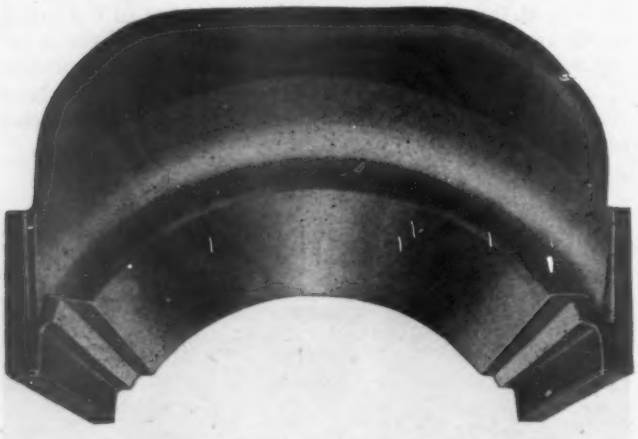
* Mechanical engineer, New York, New Haven & Hartford, New Haven, Conn.
† Supervisor car inspection and maintenance, New York, New Haven & Hartford, New Haven, Conn.

movable parts, should be a part of the brass itself, should not be too expensive, and should not require any additional labor for inspection or maintenance.

Wipers intended to remove foreign matter that might cling to the revolving journal were investigated. They not only removed the foreign matter, but wiped the oil off the journal surface and caused a failure on the first trial during switching operations in the make-up of the train at the terminal. This test demonstrated to us that it would not be a good thing to have anything rub directly on the journal bacause of the danger of removing the necessary lubrication from the journal as well as the danger of having a wiper deface the smooth surface of the journal itself.

Photographs show that, with a standard A. A. R. brass, when the waste starts to roll on the rising side, it goes up against the lower underside edge of the brass and remains in the "danger zone" where lint, loose ends, and sections of waste can be grabbed and pulled under the lining of the brass and on to the journal proper. We felt it necessary, therefore, to find some means to move this rolling waste away from the journal and toward the side of the box to eliminate the possible danger of grabbing.

A journal bearing was designed which had two integral extensions, one on each side of the brass, extending its full length. These extensions were located so as to allow about ⅛-in. clearance at all times between the journal and brass and to project about ½-in. below



Bearing design employed on the New Haven which is responsible for reduction of waste grabs and resulting hot journals

the under side of the brass. These projections added considerably to the structural strength of the brass, prevented rocking and definitely stopped waste grabs in regular switching and road operation. With the build up of train speeds, the eddy current of air created between the journal and the integral extension ledges along the sides of the bearing diverts lint to the box side. This accumulation is in evidence on high-speed trains. Further, the extended deep sides prevented rocking and guided the bearing to its natural position on the journal.

Proving that these brasses would stop waste grabs under all operating conditions was our next step. In 1935, eight new 5-in. by 9-in. modified A. A. R. brasses were made incorporating the two integrally-cast waste-repelling ledges. These brasses were placed in test service on a dining car. Journal boxes were packed to the full center line of the journal to aggravate the tendency to waste grab. A nine months' test period followed and no report of any waste grab was received. These added waste deflecting projections actually repelled the rolling waste away from the journal toward the sides of the box.

After the original test, approval was given for further applications to other cars. About March, 1937, 48 special brasses were applied to four more dining cars. About June, 1937, 200 special brasses were applied to fifteen streamline passenger cars and to four standard passenger cars and one dining car, all with 5-in. by 9-in. journals. In June, 1938, 400 special bearings were applied to 50 new streamline passenger cars. Up to about September, 1942, these fifty cars ran over 150,000,000 box miles without a single failure due to waste grab or hot box. An additional 50,000,000 box miles were added up to September, 1943, without any sort of failure.

An outside laboratory test was made in 1938 to check our findings that this bearing would stop waste grabs. Arrangements were made with the Magnus Metal Corporation to run a series of tests on their special testing machine. The findings were, "These test runs did not result in a waste grab and the special design of the bearing with its extending ledges did turn the waste away from the journal when the waste was moved to contact with the ledge."

In 1940, 50 new caboose cars were built on which standard A. A. R. bearings were applied. After a short time, these bearings were running hot, and waste grabs were developing because the cars were used on a section of road where pusher engines were employed. These brasses were removed and replaced with the special brasses. No further trouble was reported. Seventy-five more new caboose cars of the same design have been purchased since with these special brasses, and all of them are still operating without a hot box from any cause.

We were having considerable hot-box trouble on locomotive tenders. Tender hot boxes are seldom heard of now since we have applied the special brasses.

In June, 1939, it was reported that there had been no trouble of any kind from the 648 special brasses then in service. Tests continued until May 1, 1942, with no running hot or any demonstrable failure chargeable to these bearings.

These bearings were adopted May, 1940, as standard on passenger cars and locomotive tenders having A. A. R. standard axles. This action was taken because it seemed definitely proved that this bearing had greater durability, gave better lubrication and prevented waste grabs.

In January, 1940, 2,000 additional special bearings were applied to 250 self-clearing twin hopper cars which have a capacity of 120,000 lbs. each. A very careful performance record has been kept on all these cars and in two 15-month repack periods not one hot box has been reported due to waste grab.

In May, 1941, 8,000 of these bearings were applied to 1,000 new 60-ton box cars. No exact record was kept of the large mileage covered by these cars which gave trouble-free operation with no hot boxes reported due to waste grabs for two 15-month periods. None of these hopper or box cars have appeared on a train or car performance sheet with a hot box since they were built.

Some of these bearings have been removed when wheels were changed but they are few in number. Emergency brasses have replaced the special bearings found defective at the time for periodic repacking.

A policy has been adopted of not relining any passenger- or freight-car brasses. Experience has shown that many times a hidden flaw will exist in a brass and may be the cause of an early brass failure when it is put under the stress of operation. The added cost of new bearings over relined ones has been well-justified by an exceptionally good record.

EDITORIALS

Electrical Potentials

The hand-to-mouth kind of procedure which has characterized all railroad operations for several years must be continued at least for the duration of the European phase of the war. It means a continuation of material conservation, the doing of more with less manpower, and in many cases the making of installations which must be replaced when circumstances permit. Codes have been relaxed, but in most cases it may be expected that they will again be reestablished in much of their original form. Some of the substitutes permitted will be accepted as being superior to older materials but this will not have much bearing on the replacement of installations. The situation is creating a lot of deferred work, but the volume represented is small in comparison with new work based on the adoption of many engineering developments awaiting release.

One requirement which can not wait is adequate electrical maintenance facilities for Diesel-electric locomotives. Although this type of motive power has been in railroad service for 20 years, it was not until 1940 that any considerable amount of road power was used, and it is the locomotives hauling heavy high-speed trains which require heavy-duty service of traction motors.

In the car lighting and air conditioning field there is an extremely difficult maintenance situation which must look to the future for its final resolution. Cars have been overworked so intensively and for so long that much new and rebuilt equipment is required. This situation will be intensified by the railroads' need for the best in passenger cars to meet postwar competition. Material has already been released for the building of 40 aluminum and 15 steel passenger cars and it is estimated that it will be necessary to build from 2,000 to 3,000 cars per year for a period of five years.

Train communication offers real improvement of train operation and fulfills immediate needs so well that orders have been placed for installations covering 1,039 miles of line and costing nearly $2,000,000. As its use is extended, a need for caboose power supply will develop. On the locomotive a larger turbo-generator or two such units may be used. At present only straight storage battery systems are planned for cabooses. These can be kept charged by terminal charging stations, but the history of car lighting suggests that eventually either axle-driven or engine-driven generators will be used to supply the necessary power.

Many enormously large and expensive lighting installations have been made in war manufacturing plants, but either the railroads have not been considered war plants, or their reputation for getting along with relatively little light is so good, that very little thought has been given to the making of improvements. In the face of constant, and, on the railroads, high depreciation of lighting fixtures and wiring, this should become a fruitful field for making beneficial improvements.

As usual, plans are being made for installations of electric traction. Actual installations require long study and large capital expenditure and are made only at long intervals. It is, however, heavy traffic density which makes the use of electric locomotives profitable, and in certain locations present traffic is extending existing steam power beyond the limits of designed capacities.

These and many other potentialities of electrical equipment are being brought nearer to realization by new devices and materials, some of which have grown out of war needs. Among these are new insulating materials which reduce size and weight of apparatus and permit higher operating temperatures, recently developed communication equipment, some of which is still awaiting military release, greatly improved public address systems, completely new types of light sources, a wide assortment of plastics, improved generating equipment, air compressors, air-conditioning control and lighting systems for passenger cars, better wiring materials, better and lower-cost capacitors, electronically controlled variable-speed motors, welding control that insures good welding, hot-journal indicators and many other protective devices. These developments and many others, a considerable part of which have been stimulated by the pressure of war, will make the postwar period interesting for those with imagination, and if effectively used will do much to retain the position and importance of the railroads in the field of transportation.

Mechanical Division Research During 1944

If one is inclined to forget that the Mechanical Division of the Association of American Railroads has been engaged extensively in the conduct of engineering research projects for the past six or seven years, a glance at the library shelf holding the research reports which have been forthcoming during this period will be a sufficient reminder. During this time extensive investigations have been conducted on freight-car trucks, on the horsepower requirements for heavy high-speed passen-

ger service, on passenger-car axles, on locomotive crank pins, and on counterbalancing locomotives for high-speed service. Some of these projects have been the subjects of several progress reports.

Reports on two projects have appeared during 1944. These are the Second Progress Report on Locomotive Crank Pin Tests and the report on the counterbalance tests. The first represents a matter which falls entirely within the bailiwick of the Mechanical Division. The latter covers a subject of interest alike to the Mechanical and Engineering Divisions and they participated jointly in the conduct of the study.

Engineering investigations are nothing new to the Mechanical Division. They have been under way almost from the beginning of the organization of the Master Car Builders' and the American Railway Master Mechanics' Associations. There has, however, been some change in the character of these investigations. A number of those which have been under way during the past six or seven years are distinguished from many of the earlier studies in that they are seeking basic engineering data affecting the strength and performance of details, whereas more, but by no means all, of the earlier projects were much less specific in the character of the data they brought together.

Of the two reports which came out in 1944 that on the crank pins is a progress report and does not represent the final results of the project. Its conclusions, however, are sufficiently definite within the scope of the second year's work to be of immediate value and, undoubtedly, many railways have already taken advantage of the information presented therein to improve their practice with respect to crank-pin fits. The conclusions of the counterbalance tests have effectively set the limits within which the overbalance compromise is satisfactory, both from the standpoint of the operation of the locomotive and the track. They should also settle the controversy over the value of refinements in rotating balance which has been carried on for a good many years.

Broad Appraisal Of Motive Power Needed

As we go into the year 1945 the railroads find themselves in one of the most favorable positions with respect to motive power in their entire history. The justification for the statement lies in the fact that the roads have many types of power to choose from; new types in prospect and a wealth of operating experience as a guide in formulating policies for the future.

Prior to the outbreak of the war, a satisfactory condition as to motive power needs was one in which there existed a reasonably safe margin of serviceable locomotives to be drawn upon for unforeseen emergencies. What that safe margin was is indicated by the records of stored and shopped locomotives in relation to the ownership. The sudden increase in demand created by wartime traffic left railroad operators without safe margins for they not only had to use up practically all of the reserve, but were not able to get new power to supplement their needs. Many railroads had partially fortified themselves against the emergency by purchases, of modern high-capacity steam units and the adoption of the Diesel-electric locomotive.

The Diesel-electric has brought home the value of intensive utilization of power and provided competition that has acted as a challenge to steam. Its outstanding performance has developed within railroad organizations both the necessity and the desire to find out whether steam power could not also approach these same performances.

The operating department forms its judgment of motive power from such factors as availability and failure-free performance. It is not concerned with matters of design nor does it care how or where the mechanical department gets the locomotives just so long as they are there when needed and do the job they are called upon to perform. An appreciation of this fact will help to understand why the Diesel has been so popular with the operating man and why it has been called the "answer to an operating man's prayer." It has served to set a pace for other types of power that has brought out hidden values and possibilities not heretofore realized and the impetus of this pace-setting is largely responsible for the operating performances that place the railroads in a position of confidence born of accomplishment.

This war will not last forever. When it ends the railroads will again be faced with the problem of conducting business in a world of intense competition in the field of transportation and where success or failure will depend entirely upon the ability to meet that competition on a profitable basis.

Possibly there never has been a time in railroad history when management was so greatly in need of a coldly practical appraisal of the entire motive power question. Management today must look to someone for the answers to questions relating to the economics of the motive power problem. Management is also faced with the necessity of apportioning expenditures for improvements between motive power, rolling stock, roadway improvements, shop and terminal improvements and a variety of other opportunities for worth-while investment.

The largest items in the entire category of railroad expenditures are locomotive repairs and locomotive fuel. The proponents of Diesel power not only claim that it will save the railroads millions of dollars in these two expense items alone but that it is an operating facility with none of the disadvantages of steam power. Those who back the steam locomotive claim that, if given the same chance, it will do just as good a job as the Diesel and do it cheaper.

Here are two sides of a controversy in which railroad management stands as the referee. The mechanical of-

ficer must recognize that it is no longer a question of how many locomotives to buy; or what kind. What management wants to know is whether to buy locomotives (of whatever type); spend money for roadway, or repair facilities, or signals—and why.

Those who are promoting the interests of the Diesel have done an excellent job in selling to railroad management not a locomotive but an operating facility having potentialities that contribute to efficient and economical transportation. The steam locomotive has never been *sold* to anyone—it has been bought by the mechanical department not as an operating facility but as one of the tools of the trade. If the steam locomotive has operating potentialities which are not sufficiently recognized; if it has not been given the job that it is capable of doing, then those who promote the interests of the steam locomotive must recognize that it is management—the referee—that must be sold on the value of modern steam power.

The railroads are entitled to have all the facts in a case of this kind. If the Diesel is better than steam, or vice versa, let's find out why. But let's not be prejudiced by the conclusions until we have made sure that it is the interests of the railroads that we have in mind.

NEW BOOKS

LOCOMOTIVE ENCYCLOPEDIA—1944 EDITION. *Published by the Simmons-Boardman Publishing Corporation, 30 Church street, New York 7. 1,396 pages, 8¼ in. by 11½ in., illustrated. Bound in Fabrikoid. Price, $5.*

The 1944 Locomotive Cyclopedia is the twelfth edition of this reference book, the first of which was printed in 1906. In general, this new edition follows the form of the 1941 book and is divided into 20 sections, each of which covers a group of associated equipment and thus simplifies reference to any particular group. The use of the book is also made easy by the five tabulated indices. There are also several bibliographies covering articles in recent publications. While the general make-up of previous editions has been retained, the subject matter has been thoroughly revised. A large amount of new material has been incorporated and only such old material retained as still represents regular current practices and which is needed to make the book complete. In the work of revision the editors have received valuable assistance from the Advisory Committee appointed by the Mechanical Division of the Association of American Railroads; the mechanical heads of practically all railroads; the locomotive builders; the manufacturers of locomotive equipment, and those supplying machine tools and shop equipment. The book contains 1,396 pages, 84 more than the previous edition and the largest number in any edition yet published. In the sections devoted to steam-locomotive equipment there are elevation drawings of a number of steam locomotives of recent design; improved lubrication equipment; new types of locomotive tenders of large capacity, and new and improved brake equipment. The section covering Diesel locomotives for railroad service has been greatly extended to cover current developments in this type of locomotive for switching, transfer and road service, both freight and passenger. Information in regard to railroad electrifications has been fully revised and brought up to date. The section on Export locomotives has been amplified to include locomotives of all types instead of only steam locomotives. New material has also been added for Industrial Locomotives. Descriptions of locomotive specialties and devices are much more complete than in any previous edition. The section devoted to Locomotive Shops and Engine Terminals and their equipment has been rewritten and expanded. Eleven chapters cover the work of the machine shop in detail. Additional chapters are included on the boiler shop, machine forging work, material handling and the engine terminal.

In this edition, there are three entirely new chapters on the maintenance and servicing of Diesel-electric locomotives. The character of the facilities needed by railroads operating this form of motive power is rapidly taking a definite pattern and these chapters represent an accurate cross section of the many problems involved in Diesel maintenance and a guide to their ultimate solution.

The chapter on Welding and Allied Operations has been completely rewritten and broadened in scope to include examples of the latest practices in flame hardening and shape cutting.

SAFETY IN ELECTRIC AND GAS WELDING AND CUTTING OPERATIONS. *By American Standards Association. Published by American Standards Association, 70 East 45th street, New York 17. 31 pages. Paper covered. Price, 40 cents.*

This is a war standard developed by a committee representing all fields of interest in the use of gas and electric welding. More than 750 manufacturers and users of welding and cutting equipment have reviewed the material presented to them and the complete work in its requirements has been generally acceptable to them. Certain of the features in it relating to ventilation are open to further study according to the committee but all others can be regarded as representing practices on which there is general agreement. Standards are set for the installation and operation of gas-welding and gas-cutting equipment; installation and operation of arc-welding and arc-cutting equipment; installation and operation of resistance-welding equipment; fire prevention; protection of personnel, and, ventilation and health protection. All recommendations are given in a clear and concise manner and the pamphlet is one with which safety and welding supervisors should be familiar.

With the Car Foremen and Inspectors

Wreck Train Equipment

R. Schey, Chairman

A complete description of the tools and facilities needed—Bunks for 16 men recommended

The requirements for wreck train equipment are of such character that it will generally come under two classifications; namely, No. 1 and No. 2 Trains.

No. 1 wreck trains should have a general make-up behind the locomotive in the following order: one truck car—all-steel flat car; one steam derrick—150 to 250 tons capacity; one idler car—all-steel flat car; one tool car—steel underframe box car; one fire-fighting car—steel underframe box car; one dining-cook car—steel underframe coach or box car; one bunk car—steel underframe box car.

Features of the Derrick

The derrick must be so constructed that it will clear all lines over which it is assigned and must not exceed the capacity for trestles, bridges and track without special authority.

The capacity of the derrick should be sufficient to handle the power dependent upon it—steam, electric, or Diesel. With larger and heavier power coming into use on many roads, greater capacity derricks are preferable and will work to better advantage with excess lifting power rather than working too close to capacity.

The steam derrick and all of the cars in the wreck train should be equipped with standard couplers, yokes and draft gears.

Derricks should also be equipped with electric lights and air-operating valves on both sides for the use of groundmen. Locking devices for outriggers should be effective and of such design as to prevent shifting when the derrick is in train movement.

Fire-Fighting Cars

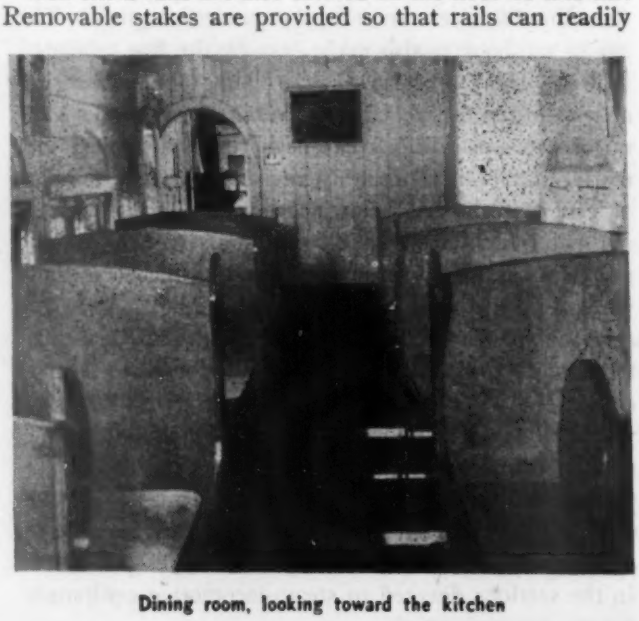
A recent addition to Class I wreck trains is a fire-fighting car completely equipped with fire-fighting apparatus to combat oil, gasoline and other fires at wrecks. This fire-fighting unit should be complete so that it can be operated without depending upon any equipment in the wreck train proper in the event it is desirable to operate the fire car to the scene of an accident at a much greater speed than is permissible for heavy wrecking derricks.

Combatting oil fires requires special foam-generating equipment, gasoline or steam pump, water supply, fire hose, firemen's equipment such as boots, coats, helmets, gas masks, asbestos suits, etc. Also first aid equipment for emergencies.

The truck car should be of all-steel construction substantial in design. The wood floor should have rails laid, shimmed up over the top of the floor so that cinders and dirt can be blown out easily. Wreck trucks should be placed on the rails and properly anchored to prevent movement in transit. In addition to the required safety appliances, the addition of vertical hand holds makes it easier for wreck-train employees to get on and off the truck car.

Underneath pockets or lockers, for heavy outrigger blocking, ties and wedges are very beneficial in loading and unloading and save a considerable amount of time and labor. Some wreck trains have an additional block car for this purpose.

Ten extra rails are also carried on the floor of this car. Removable stakes are provided so that rails can readily



Dining room, looking toward the kitchen

* Abstract of a paper prepared for the 1944 year book of the Car Department Officers' Association.

be rolled off the car. End stops keep the rails on the cars. Some railroads carry an extra rail-and-tie car for this purpose.

Idler Car

The idler car should be of all-steel construction and substantial in design. A wood floor should be provided and the car equipped with heavy lift cables, various

Bunk car with upper bunks raised and lockers partly showing

hooks required for different jobs, lifting beams for loaded and empty cars and passenger cars. Extra key-attachment couplers are also carried. This arrangement saves lifting of heavy cables and hooks, and saves valuable time and labor.

Underneath lockers about 14 ft. long are provided on each side, divided into compartments. The compartments, each labeled, contain such equipment as replacers, truck chains, jacks, journal wedges and bearings, center pins, complete oxyacetylene cutting outfit with 100 ft. of hose. The gas tanks are mounted on a carrying litter so that the outfit can readily be carried by two men. Hose is of such length that most cutting can be done without removing the carrying litter from the locker. Regulators, hose and torch are always connected up ready for instant use, but the valves on the tanks are kept closed to prevent damage to regulator diaphragms. All replacers are equipped with rail clamps to avoid spiking.

The idler car is equipped with an auxiliary water tank for the steam derrick. This auxiliary water supply is beneficial in keeping the derrick operating and eliminates time out for syphoning water from the locomotive tank. Water from auxiliary tanks is forced by air pressure from the train line and water is supplied to the wrecker tank by a hose laid along the idler car. Air pressure is controlled with a feed valve set at 15 lb. pressure. A gauge is supplied to avoid damage to the water tank. A vent valve is also supplied to vent air pressure after water is taken. Another advantage of forcing water by air pressure rather than syphoning is that the water is not heated and the injectors on the derrick will work more efficiently.

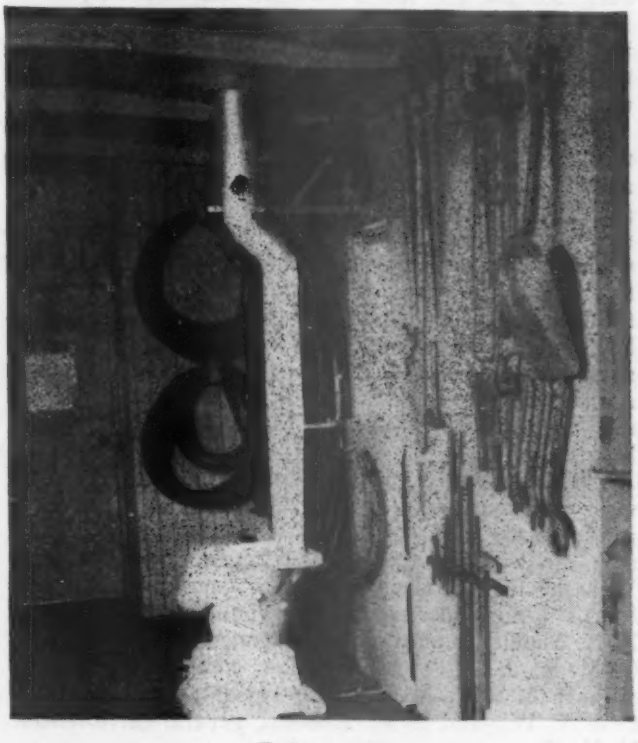
Tool Car

The tool car is a box car fitted with racks for various equipment, such as cables, chain hoist, small blocks, wood wedges, portable electric-light generator with two 500-watt floodlights and one 250-watt spot light, sledges, hammers, wrenches and various hand tools, journal jacks and body jacks, bolts of various sizes, air hose, pipe nipples, etc., assortment of special links, hooks, pulling knuckles, corner protectors, etc., bench and vise for emergency repairs, dry hopper for use of men when the camp car is not brought to the actual derailment, car oil, dope and other supplies and tire-setting equipment.

This car is equipped with side doors in addition to end doors. Underneath lockers are provided for additional equipment and extra oxygen and acetylene cylinders. A second complete oxygen-acetylene cutting equipment is provided with long and short cutting torches. A heating stove is provided. To facilitate handling heavy equipment in and out of the car, a rope falls, mounted on a swinging arm, is provided at each side door. Platform steps and additional hand holds at each doorway facilitate entering and leaving the car.

A different color is assigned to each wreck train for painting various hooks, cable sockets, small tools, etc. In the event two or more wreck trains are working together it will be easy to identify tools and equipment belonging to each outfit when ready to pick up tools and equipment. This avoids argument and keeps each wreck train completely equipped with standard tools.

All cables are provided with drop-forged zinc-poured open-end sockets. With this arrangement two and more cables can be combined with links and pins to provide a cable of any length for pulling or rolling cars away from the right of way. This eliminates handling of awkward long cables and in the event a cable is damaged, only a short section will be scrapped. Special cables such as drawbar slings, bridle slings, chokers, etc., have recently been provided, made of braided wire rope. These braided ropes are more flexible and lighter than



Tool-car room

conventional plow steel cables. It is important that pure virgin zinc be used for rope attachments, as babbitt and substitute materials will not give adequate lifting capacity.

Bunk Car

The bunk car is a 40-ft. box car equipped with double-deck Pullman-style beds. Accommodations are provided for 16 men which takes care of the regular wreck crew as well as extra men such as machinists, etc., who may accompany the wreck train. There is an individual locker for each member of the wreck crew. Large drawers are built in underneath lower beds for storage of clean linen and blankets. When beds are not in use, mattresses and pillow cases are kept covered with canvas to keep them clean. This canvas is removed when beds are made up for use. Bunk cars are equipped with electric lights.

Dining and Cook Car

A steel underframe coach or dining car is used. The general floor plan provides for a complete kitchen built in at one end. The kitchen contains a dining-car range, ice boxes, sink, work table, cupboards for storage of dishes, staple groceries and silverware, flour bin, potato bin, space for garbage cans, etc. Hot and cold running water is supplied in the kitchen from overhead tanks. These tanks can be filled from the ground with a standard coach watering hose or garden hose with the use of adapter fittings.

The dining room, next to the kitchen, is equipped with four-seat tables along both sides of the car with an aisle between. A partition and door is provided between the dining room and the washroom which is equipped with lavatories, enclosed shower, enclosed flush type toilet, etc. The water is supplied with overhead tanks and a coal water-heater is installed for heating wash water.

At the opposite end of the car there is a private office for the wreck foreman. This office contains a double-deck bed for the wreck foreman and assistant wreck foreman, a desk, a cupboard for stationery and instructions, clothes lockers, etc. It also is equipped with electric lights supplied by batteries and an axle generator to keep the batteries up while running.

No. 2 wreck trains have a general make-up behind the locomotive in the following order: one truck car—all-steel flat car; one steam derrick—75 to 100 ton capacity; one idler car—all-steel flat car; one tool car—steel underframe box car; one dining-camp car—steel underframe coach; and one bunk car—steel underframe box car. (The bunk car is furnished only on wreck trains when the dining and camp car is not of sufficient length to accommodate bunks for the men.) Equipment and general make-up of No. 2 wreck trains is similar to No. 1 wreck trains with the exception of the size and amount of various cables and slings, lifting beams, etc.

The report was signed by R. Schey, chairman, supervisor car maintenance, N. Y. C. & St. L.; W. T. Wright, car foreman, C. & E. I.; H. H. Young, general foreman, car dept., I. C.; A. L. Miller, general car foreman, Wabash; R. B. Fisher, regional master car builder, B. & O.; J. Grimmer, master car builder, E. J. & E.; F. A. Shoulty, assistant superintendent car department, C. M. St. P. & P.; H. J. Baker, equipment inspector, cars, P. M.; W. R. Hall, supervisor car maintenance, C. & N. W.; and L. W. Dobbins, general car foreman, N. Y. C.

Tank Car Repairs*

One of the most serious problems facing the Petroleum Administration for War during the early days of the war was the transportation of petroleum and its products from the oil fields and refineries of the Southwest to the Eastern Seaboard which, until the war, had depended upon oceangoing tankers for 98.5 per cent of its supply. In converting to overland transportation, it became essential to move tremendous quantities of petroleum and refined

Workmen effect quick repairs to the damaged end sill of a tank car at the Twin Oaks repair yard

products in railroad tank cars. Between 1941 and 1943 railroad transportation of petroleum to the East Coast was revolutionized so that by June of the latter year more

At the Marcus Hook repair shop the bent center sill of a tank car is straightened and then reinforced, using an extended-handle air hammer

than 80,000 of the nation's 107,000 tank cars in petroleum service throughout the United States were in this service.

Innumerable problems resulted from the evolution. The

* From information furnished by the Petroleum Administration for War, Washington, D. C.

Petroleum Administration urged the oil industry to exercise all of the ingenuity at its disposal to keep the cars rolling. The following article describes how one company, disregarding the additional costs involved, has met this challenge by developing a program of tank-car repairs that eliminates the delay of sending equipment to repair shops, thus greatly reducing turnaround time and increasing deliveries.

At two principal terminals, the Sun Oil Company has

While still on the repair track, this damaged tank car gets a new body — bolster cover plate — Quick repairs have greatly reduced turnaround time

installed facilities to do speedy repair work right on the tracks, instead of sending the cars to railroad shops. Exclusive of investment, this work is costing Sun $300,000 a year more than the allowable cost set by the Association of American Railroads.

The results, according to traffic executives in charge of such repairs, is an efficiency in tank-car handling at least 50 per cent greater than the average. The turnaround time between company terminals at Twin Oaks, Pa., and Meraux, La.—a round trip of nearly 3,000 miles—has been cut to less than 12 days. Sun's average delivery of crude oil per tank car per day on this run is 19 barrels, as compared with the average of 12 barrels for the same distance for the industry as a whole.

The importance of this margin to the war-time oil supply is emphasized by the volume of the company's tank car traffic, which in 1943 amounted to 350,000,000 mi.

Though construction of the Big Inch and Little Big Inch pipelines under direction of the Petroleum Administration for War has greatly eased the situation on the Atlantic seaboard, substantial railroad tank car shipments are still necessary. Rail movement of oil products is expected to take on added importance as increased quantities have to be delivered at Pacific Coast ports for enlarged operations against Japan.

Benjamin P. Atkinson, Jr., general foreman of both the on-the-track repair yard at Twin Oaks and of Sun's heavy repair shops at the Marcus Hook, Pa., refinery, has this to say:

"We work night and day, seven days a week. These cars are taking an awful pounding, but we have to make permanent repairs and get them rolling again, and that applies to a good many cars that would simply be scrapped in time of peace.

"The most common damage is a cracked or bent centersill, which can be caused by suddenly braking a train, by pushing a heavy string of cars over a grade, or other kind of rough handling.

"For leaks in the tank we have curved plates all ready to rivet on.

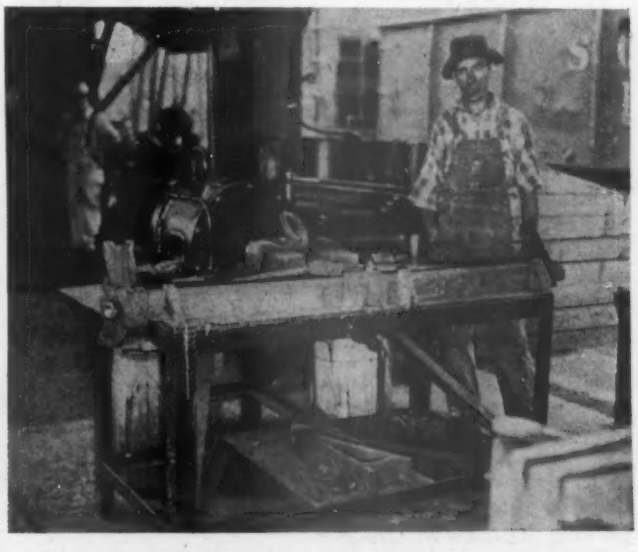
"Most of our men have been trained right here. They come from all kinds of occupations, and many of them had never done any mechanical work or even physical labor before. But during 1943, we managed to make 37,222 tank-car repairs at Twin Oaks, and 2,000 repairs were made at Meraux, La."

Meraux is one of a number of new loading installations that are a part of Sun's war effort. They receive crude oil by pipeline and barge, and are so located as to reduce substantially the rail tank car mileage. The Twin Oaks repair yard is also an unloading siding, serving the Marcus Hook refinery.

Brake Beam Assembler and Tester

The assembly and testing of brake beams is carried on at the Chattanooga, Tenn., car shop of the Southern on a single table which has been designed to serve both uses. The table top is equipped with all necessary stops and blocks for the assembly operation and the fittings needed for testings are readily set in place when that work is being done. The power source for both assembly and testing is an air cylinder mounted horizontally and equipped with a two-way control valve and a pressure gauge.

When beams are being assembled the channel section and fulcrum are properly positioned against the table stops. The truss rod, threaded but not bent, is next



Truss rods are bent with a forming die fastened on the air cylinder piston

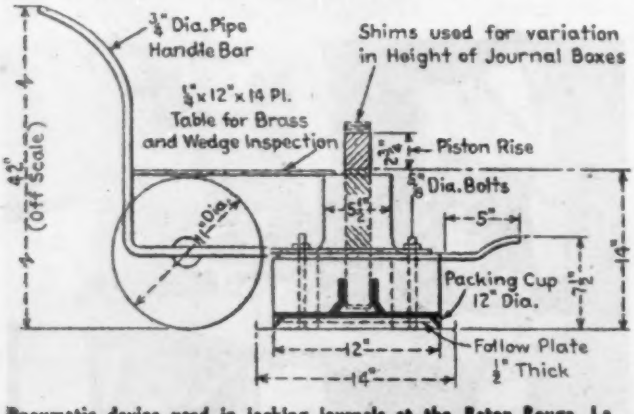
placed in position and the admission of air to the cylinders advances a vee-shaped die which bends the truss rod to the proper angle and holds it in position while the brake shoes are applied and the holding nuts drawn up tightly.

Assembly and testing work is all done at this work table—One of the holding shoes for the tension test is shown in position at the left side of the table

After a beam has been assembled it is tested by attaching a hook to the air-cylinder piston through which the test force is applied to the beam as the piston is reversed. The beam is held in position on the table for this operation by a pair of demountable shoes which are slipped into slots on the table. The brake heads fit against these shoes which have the same contour as the backs of standard brake shoes.

Pneumatic Journal Jack

The ingenious and time-saving pneumatic journal jack, illustrated, won a suggestion award for its designer, a carman employed at the Baton Rouge, La., car repair tracks of the Illinois Central, as described in the Illinois Central magazine issue for September, 1944. The new

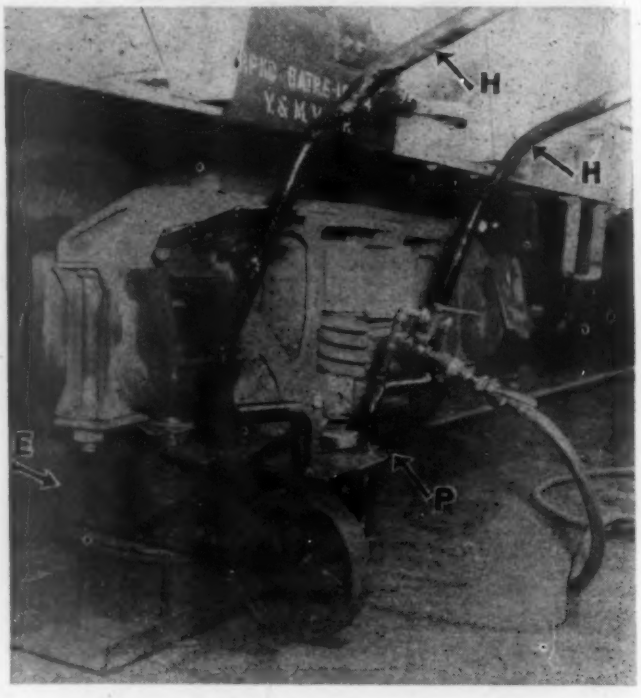


Pneumatic device used in jacking journals at the Baton Rouge, La., car repair tracks of the Illinois Central

jack is described as a decided improvement over the hand-operated standard car jacks formerly used in repacking journals at this point.

The jack consists of an air-brake cylinder with a 12-in. piston and non-pressure head, the cylinder being reduced to 4½ in. in length and welded to a 14-in. by 30-in. flanged base plate. Four ⅝-in. bolts welded to the base plate extend upward through the non-pressure head of the brake cylinder and engage the flattened ends of two braced 1-in. pipe sections which serve as the frame of the device, supporting a single 11-in. truck wheel in bearings just outside the brake cylinder and being offset, bent and extended upward to form handle bars *HH* which are 28 in. apart and 42 in. high at the upper ends. A ¼-in. by 12-in. by 14-in. plate *P* rests on one end on the brake cylinder and is cut out at the sides so that it fits in between, and serves to space the two pipe-frame sections to which it is welded. This plate makes a convenient table for the inspection of journal brasses and wedges.

Extension plate *E* which projects 5 in. beyond the



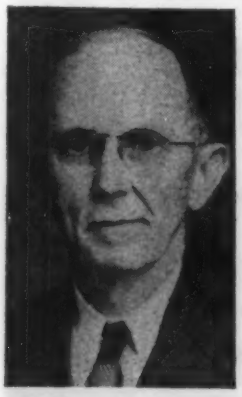
Pneumatic device used in jacking journals at the Baton Rouge, La., car-repair tracks of the Illinois Central

brake cylinder serves to position the jack when it is rolled under the journal box and also tends to hold the wheel down against any possible lifting tendency during the jacking operation. Round steel shims of varying thickness are used to take care of varying journal-box height and one of these shims is shown in the illustration resting on plate *P*. Admission of air to the brake cylinder during the jacking operation is controlled by means of a small cut-out cock in the hose line which is, of course, closed when the journal box has been jacked up to the desired height. The box can be easily lowered any desired amount until it rests on the wedge and brass by exhausting air from the cylinder through the other air cutout cock illustrated.

This device has the important advantage of being easily portable for movement by one man anywhere about the car shop or car repair tracks. It can be inserted under the journal box with a minimum of physical effort and no time need be lost looking for wood planks or blocking material. The actual lifting operation also requires absolutely no manual work and is done in minimum time.

This journal jack is said to be practically fool-proof in operation and there is no danger of slipping. The only necessary precaution is keeping fingers out of the journal box while it is being lowered onto the wedge and brass and any responsible carman will know enough to look out for that.

Servicing on Through Runs*



E. G. Sanders

By E. G. Sanders†

Adequate and suitably located terminal and intermediate facilities cut down assignments

The two most important considerations in connection with installation of servicing facilities for locomotives used in long through runs are, first location and, second, design of the facilities so that all servicing operations can be performed with one spotting of the locomotive. Servicing facilities at intermediate stations should be located on the main line tracks where operating conditions will permit. This is particularly important for passenger locomotives.

Water cranes should be provided that will deliver water to the locomotive tender at a rate fast enough to fill the largest capacity tender in 3½ min. The minimum delivery rate for water should be not less than 4,000 gals. per min., and with tenders having a water capacity of 20,000 gals. or more, the delivery rate should be over 5,000 gals. per min. Water cranes are now in service that can deliver 7,000 gals. per min.

Delivery of fuel should be accomplished within time required to fill the tender with water, or not to exceed 3½ min. For coal-burning locomotives, this requires swinging aprons or spouts that will permit filling the tender without moving the locomotive. Installations have been made where the spout swings parallel with the track that will deliver 42 tons of coal in 75 sec. The fast delivery of fuel oil to oil-burning locomotives requires oil cranes capable of delivering 1,000 to 1,200 gal. of fuel oil per min. Heavy fuel oil generally used on oil burning locomotives must be maintained in the wayside supply tanks at temperatures ranging from 130 to 160 deg. F.

* Abstract of a paper prepared for the 1944 year book of the Railway Fuel and Traveling Engineers' Association.

† Fuel conservation engineer, Atchison, Topeka & Santa Fe.

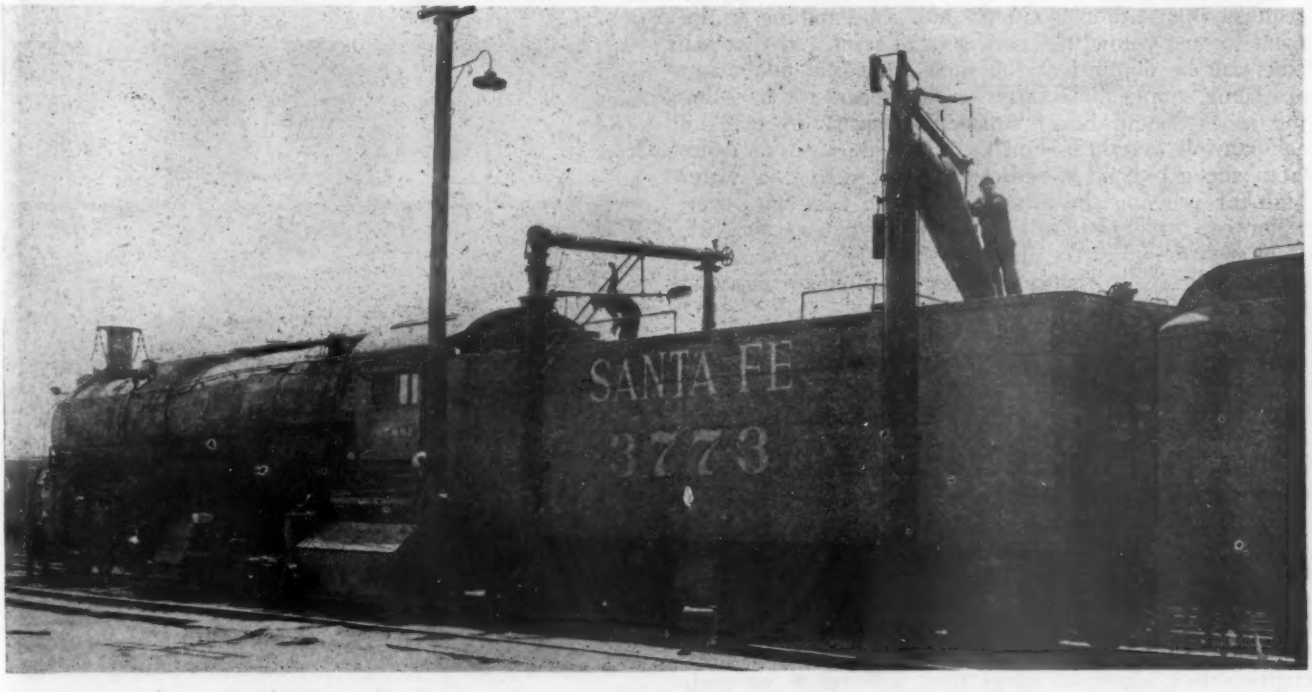


Fig. 1—Servicing an eastbound passenger locomotive at a station stop—Similar facilities for westbound trains are located at the opposite end of the platform

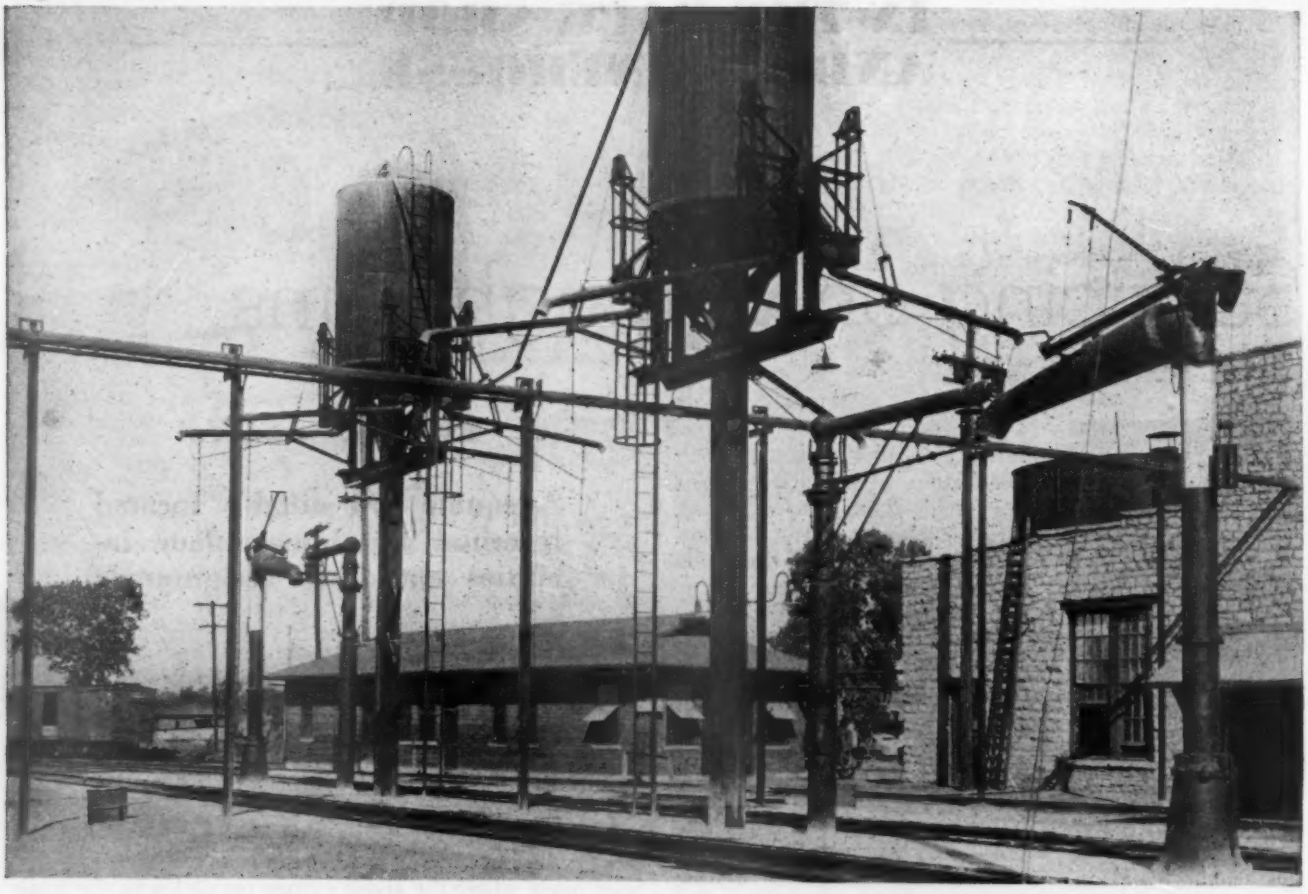


Fig. 2—High-speed servicing facilities for oil-burning freight locomotives at an intermediate terminal

to assure this fast delivery. This is also necessary so that no steaming difficulties will occur due to the oil being too cold to flow to the burner or too heavy and thick to atomize properly.

The dumping of ash pans on coal-burning locomotives requires installation of cinder- and ash-handling equipment located below and between the tracks so that ash pans can be dumped at the same time coal and water are being supplied. Hoppers or dump cars for handling the ashes should be of sufficient capacity to take an ash-pan-full of ashes. For the quick removal of ashes from the ash pan, it is desirable to provide a water hose for washing the ashes out of the pan. However, water can only be used during non-freezing weather. It is essential to shake the grates before arrival at the station in order to reduce the time required for cleaning fires to a minimum.

Sanding facilities should be provided at some of the more important servicing stations. Adequate sanding facilities are particularly important at stations where oil-burning locomotives are serviced. Facilities for delivery of sand to oil-burning locomotives should have two overhead sand bins or reservoirs so rail sand can be delivered to the sand dome simultaneously with the delivery of flue sand to the sand box on the oil tank.

Rapid servicing of locomotives at the initial and final terminals is just as important as it is at intermediate servicing stations en route. The heavy traffic now being handled by all railroads due to the war has doubled and trebled the number of locomotives turned at most large enginehouses. Serious congestion will occur at such terminals if the locomotive servicing facilities are inadequate or not properly located.

[The author here referred to an article in the September 2, 1944, issue of the Railway Age describing improvements which were made at the Armourdale, Kan., terminal of the Chicago, Rock Island & Pacific.—EDITOR]

The high-speed facilities for servicing oil-burning

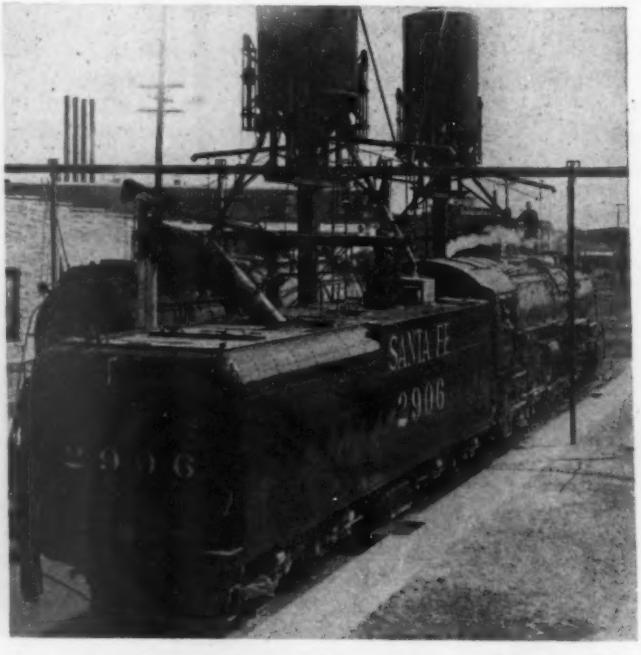


Fig. 3—Fuel oil, water, track sand and firebox sand being delivered to two locomotives simultaneously

steam passenger locomotives shown in Fig. 1 serve eastbound passenger locomotives. They are located at the east end of a passenger station platform so all servicing operations can be performed while the train and locomotive are standing at the station. Similar facilities are located at the west end of the passenger station platform for servicing locomotives on westbound passenger trains. It will be noted that two employees are supplying fuel oil and water to the locomotive and that other employees are lubricating the main- and side-rod bearings with high-speed air-operated grease guns. Other operations performed include inspection of the locomotive, checking of lubricating oil in driving and journal boxes, removal of carbon from firebox and replenishment of miscellaneous supplies. The locomotive is standing over an inspection pit which is provided with electric lights and is of sufficient depth so the inspector can make underneath inspection standing in the pit. It requires an average of eight minutes for complete servicing of a locomotive at this station. The servicing time can be reduced to five minutes if necessary.

This passenger locomotive handled a train from Los Angeles, Calif., to Kansas City, Mo., a distance of 1,791 miles. Locomotives of this type operate on six daily trains (three westbound and three eastbound) between Kansas City and Los Angeles. Twelve different engine crews are required to handle one train between these points. Fuel oil is supplied en route six times westbound and five times eastbound and water supplied sixteen times in both directions. Enginehouse employees meet the locomotive at eleven intermediate terminals where engine crews change to inspect and service the locomotives. The locomotives used on these long runs average from 13,000 to 14,700 miles per month per assigned locomotive and 15,300 to 19,500 miles per month per active locomotive.

Railroads operating coal-burning locomotives on through passenger runs usually locate intermediate servicing facilities some distance from passenger stations to avoid the dust and dirt incident to the handling of coal and ashes. This involves extra stops for servicing. To reduce the delay to a minimum, coal docks have been designed and installed that deliver 42 tons of coal in 75 sec. The fast delivery of coal is accomplished by the use of a spout (called a bootleg) that swings lengthwise of the track. A hopper is installed underneath the track with sufficient capacity to hold all of the ashes in the ash pan. Water is delivered at the rate of 3,500 gals. per min. The delivery of fuel and water and dumping of the ash pan is performed at one spotting of the locomotive.

Freight locomotives operating on long through runs usually do not use the servicing facilities installed for passenger locomotives. The general practice of handling freight locomotives at intermediate terminals where engine crews change, is to uncouple the locomotive from the train and bring it to the enginehouse for servicing and supplies. Servicing facilities should be located on tracks adjacent to or near the enginehouse where the locomotives can be moved to and from the trainyard with minimum delay.

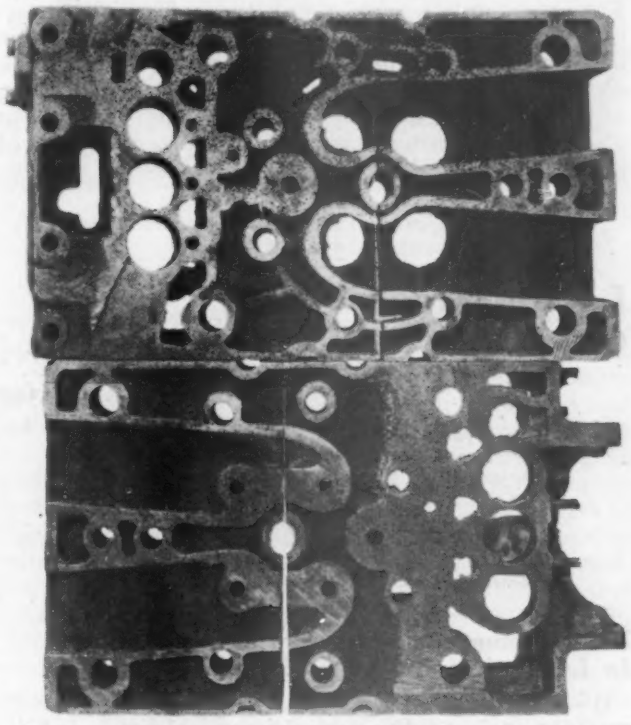
Facilities for servicing freight locomotives should be designed so all servicing operations can be performed in the shortest possible time. A minimum of two servicing tracks should be provided and the facilities so arranged that locomotives can be serviced with one spot in either direction on both tracks.

An installation of high-speed servicing facilities at an intermediate terminal for oil-burning freight locomotives is shown in Fig. 2. Water, fuel oil and sand are being furnished simultaneously. An oil-burning locomotive requires sand for cleaning flues in addition to rail sand. It will be noted that two sand spouts are provided so rail and flue sand can be supplied without moving the locomotive. Fig. 3 shows two locomotives being serviced simultaneously. These locomotives operate in freight service on through runs between Argentine (Kansas City), Kan., and Clovis, N. M., a distance of 637 miles, which is the longest through freight run on the Santa Fe. There are twenty-five locomotives of this class in this assignment and they are making 8,000 to 9,000 miles per month per assigned locomotive. It would not be possible to obtain such high mileage without the installation of high-speed servicing facilities. Without these facilities it would be necessary to relay the locomotives at two intermediate terminals and this would necessitate keeping two relay locomotives at each of these two terminals, or would require an assignment of twenty-nine locomotives to make the same mileage now being made by twenty-five locomotives.

The cost of installing all the new servicing facilities between Argentine, Kan., and Clovis, N. M., was considerably less than the cost of one new locomotive. This emphasizes the importance of installing new servicing facilities or improving existing facilities when new locomotives are purchased.

Chemical Treatment of Diesel Engine Cooling Water

The Reading Company is now treating chemically all water employed in the cooling systems of Diesel-electric locomotives. The work is done under the supervision of a field chemist assigned from the railroad's test department to insure that chemicals are used in the proportions required. He also makes periodic checks of the treatment to assure the stability of the results. The present



Condition of Diesel-engine cylinder head from a unit in which water treatment was employed—Water passages are clean—The dark appearance of the water jacket results from the inhibiting action of the chemicals used

work was started in 1939 when it was realized that cooling-system water should be treated to minimize corrosion in the cooling system. However, at that time, there was no existing standard or accepted practice or procedure in use.

Conventional chemical treatment used for steam-locomotive-boiler feed water will not produce satisfactory results. The problems involved are different due to the higher pressures and temperatures employed in steam-locomotive operation. The reaction products of this type of treatment in steam-boiler feed water can readily be eliminated by blowing down the boiler. In the case of Diesel-electric-locomotive cooling water they can only be eliminated by frequent draining and flushing of the entire system.

Studies were made by the engineer of tests and various treatments were experimented with until August, 1941, when a chemical compound having a sodium dichromate base was adopted. Similar compounds to the one in use on the Reading are manufactured by a number of companies specializing in the chemical treatment of water. The compound is added in the proportion of 20 ounces to 50 gal. of cooling water.

The raw-water supply on the Reading has an average hydrogen ion factor of Ph 6.7 which is definitely in the corrosive range. After chemical treatment the Ph value average 8 which is definitely alkaline and represents a desirable condition to prevent corrosion. The compound used is very stable and, in general, will maintain a hydrogen ion factor of Ph 7-plus for approximately three months without additional treatment. However, in order that the condition of cooling water may be known at all times, test analyses are made by a field chemist and additional compound added if it is found to be needed. At three-month intervals the cooling system is drained and flushed thoroughly with plain water. The cooling system is then refilled and the proper amount of chemical added. This work is supervised by the field chemist.

The photograph shows a section cut through a cylinder head which was approximately six years old. All of the water passages are revealed to be clean, the dark appearance of the water jacket being due to the inhibiting action of the chemical treatment used. According to experience on the Reading, the prevention of corrosion and blocking of water passages not only prolongs the life of parts but also results in better operation from the standpoint of maintaining desirable engine temperatures.

Locomotive Boiler Questions and Answers

By George M. Davies

(This department is for the help of those who desire assistance on locomotive boiler problems. Inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless special permission is given to do so. Our readers in the boiler shop are invited to submit their problems for solution.)

Embrittlement In Locomotive Boilers

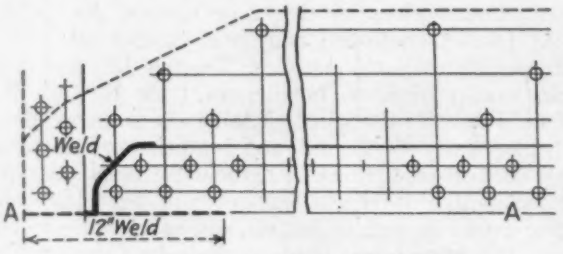
Q.—What protective measures can be taken against embrittlement in boiler plates and the seams of locomotive boilers?—D. E. V.

A.—On boilers in service the simplest protection is water treatment. The feed water can be checked by using an embrittlement detector and, if it is found to be causing embrittlement, proper chemical treatment can be added until the water is made non-embrittling. Embrittlement occurs only when the metal is under stress. Stresses can be structural, pressure, or cold working. Pressure and structural stresses in the seams should not be excessive if embrittlement is to be prevented. In fabricating the boiler the cold working of the shell course and seam welts should be kept to a minimum and extreme care should be taken when riveting so that cold working stresses are not set up in the metal due to high riveting pressures or excessive caulking.

Welding Longitudinal Seam

Q.—What advantages, if any, are obtained by welding the longitudinal joint of a boiler shell course before applying the inside and outside welt straps?—E. K.

A.—The welding of the longitudinal seam of the boiler shell course before applying the inside and outside welt straps is intended to insure a tight seam. It has been the practice to weld the ends of the longitudinal seams as



Longitudinal butt strap welded adjacent to the circumferential seam

illustrated to insure a tight seam and eliminate the necessity of caulking the outside welt strap adjacent to the circumferential seam of the next course.

The joint of the shell course to which the seam is attached is along the line *A-A*. Because the edges of the inside welt strap are not caulked, the tightness of the seam is dependent upon the caulking of the outside welt strap. The caulking and welding of the outside welt strap causes the seam to be tight at all points except in the short space between the end of the butt strap and the shell plate of the adjacent course. For this reason this area must be welded to insure a tight seam. The weld is usually made about 12 in. long. Extending this weld the entire length of the boiler course would insure a tight seam with the tightness of the seam not being dependent upon the caulking of the outside butt strap.

Crown Bolt Taps

Q.—Should the tap used in applying crown bolts have continuous threads the full length of the water space or should a short tap with long leads be used?—F. I. M.

A.—When the crown bolts to be applied are threaded on a turret lathe with both ends threaded at the same time it is better to use a continuous thread tap. When each end of the crown bolt is threaded separately it will make no difference if the short tap is used as the threads on one end may not line up in respect to those on the other end. The general practice is to use a short tap with a plain spindle of the required length screwed into the end of the tap. When using a tap with a plain spindle no attempt is made to synchronize the threads of the inner and outer sheets and it has been found by experience that the rejects because of stripped threads are negligible.

Welded Construction of Locomotive Wheel Centers*

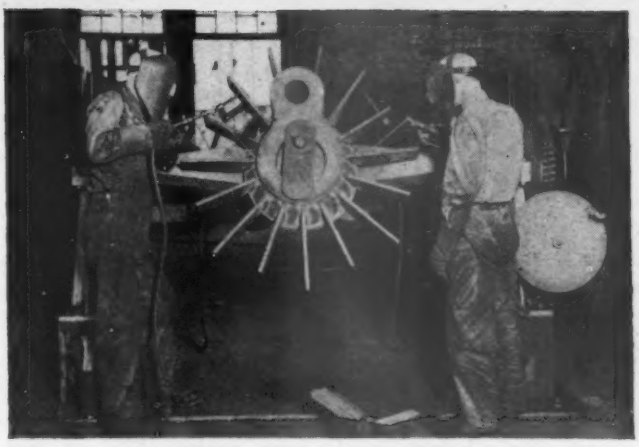
One of many successful adaptations of the electric-arc process is in the locomotive-wheel-center construction being done by the Pennsylvania at its Altoona, Pa., shops.

Component parts of the wheel-center assembly are made up of items ranging from short sections of small-diameter tubing to the large circular rim which is 2 in. thick. The hub section is 5 in. in thickness and other parts have a thickness of ¾ in. The members are flame-cut and roll-formed.

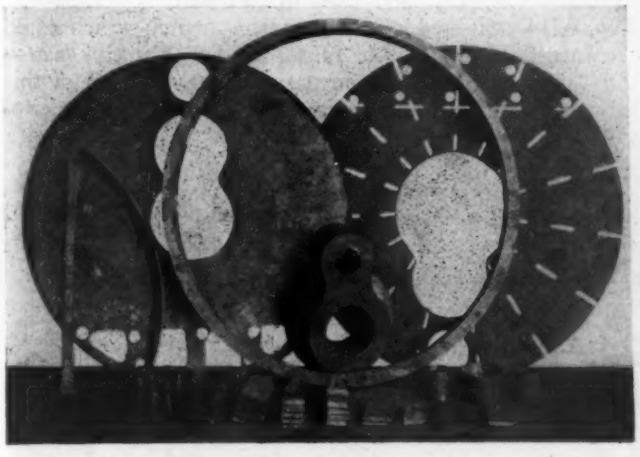
Spoke sections are of mild steel and they are made in two parts. The outside parts are tack-welded to the rim in a turning fixture designed to facilitate weld positioning. The inside sections are also tack-welded to the hub in the same positioner. After the tack-welding operation, finish-welding to the hub and rim is done in two passes using mild-steel electrodes. Rod sizes of $\frac{5}{32}$-, $\frac{3}{16}$- and ¼-in. diameters are used. Intermittent bead welds at the joints are applied in sequence to avoid overheating and possible distortion.

The rim and hub sections are then clamped in a jig and the veed ends of the spoke sections are welded solidly into single spokes. The joints on the spokes are double-veed and fused into one unit by applying 12 passes on each side. The assembly is again placed in the positioning fixture and two operators weld the spokes to the outside sheet of the wheel center. To avoid distortion when welding the mild-steel sheet to the high-carbon-steel rim and hub, the assembly is placed in a heating furnace to maintain the work at a temperature of 900 deg. F. The furnace is gas-fired and heavily insulated with asbestos. The inside sheet is then welded to the spokes by applying a plug weld in a single pass through slots in the sheet. This work is also done in the heating furnace.

The total weight of the wheel center shown, after machining, was 2,670 lb. The assembly required the depositing of 205 lb. of weld metal.

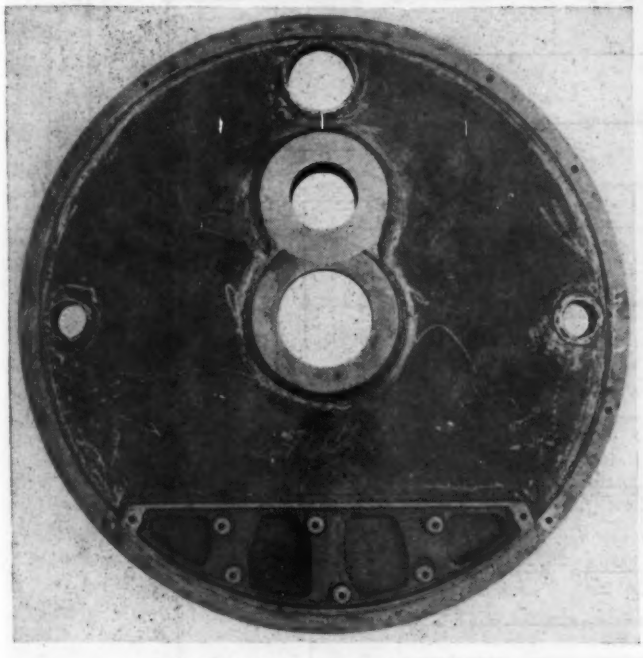


Welding half spoke to the hub section



The parts required are flame-cut and roll-formed

Spoke sections are joined by welding in a jig



Welded wheel center after machining

Elevated temperatures required for some operations are obtained in a gas-fired furnace

* Information and photographs from a field service report of the Lincoln Electric Railway Sales Co., Cleveland, Ohio.

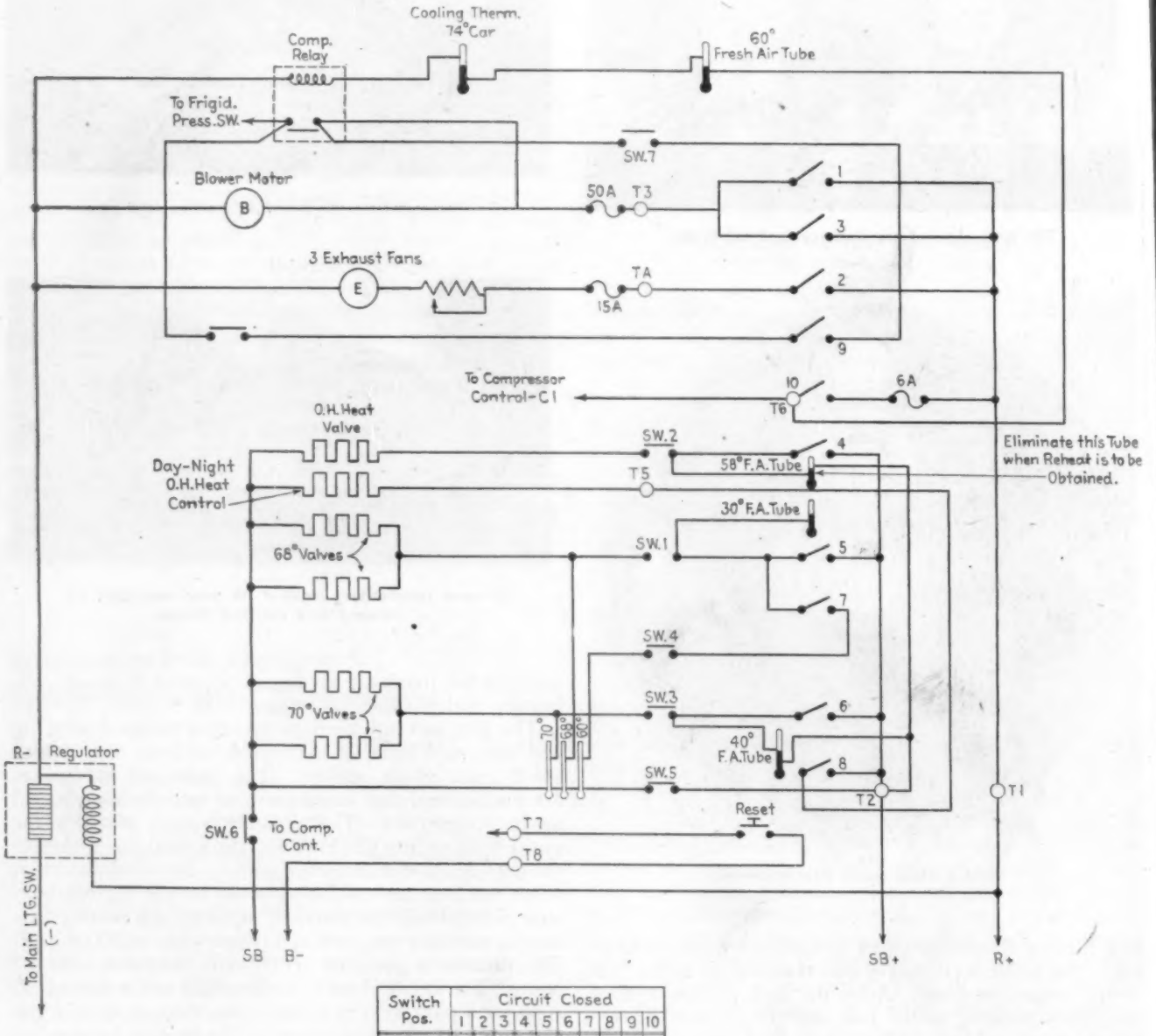
Simplified Control for

Heating and Air Conditioning

ON RUNS from New York City to Miami, Fla., or St. Petersburg, it is not uncommon, because of changes in climatic conditions, for the cars to require cooling when leaving New York City; heating during the night around Richmond, Va., and cooling again the next day. Although there is a porter assigned to each car, sometimes he and the train crew are too busy with other duties to change the selector switch, from *cool* to *heat* or vice versa, when the outside air temperature has dropped or increased sufficiently to necessitate this change.

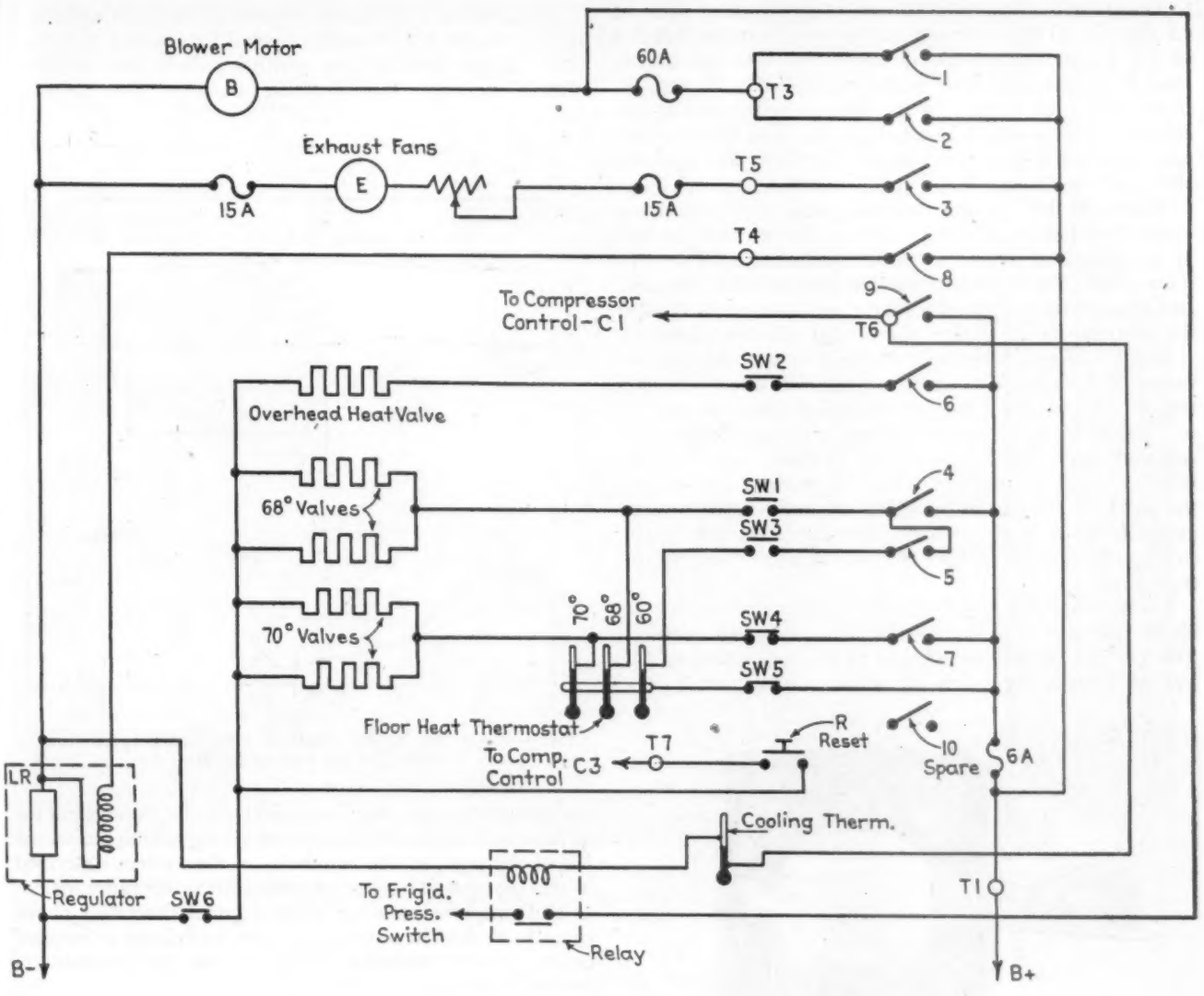
To eliminate, as much as possible, this manual operation of the selector switch on the control panel by the train crew, the Fulton Sylphon Company worked with the Seaboard Air Line to develop a control panel that would automatically set up the car for either heating, cooling or ventilation, completely independent of train crew operation and determined only by the climate the car encounters.

The control panel originally furnished by the Fulton Sylphon Company and used in Seaboard Air Line Car No. 6214 consisted of one operating switch which could be turned to any one of four positions, namely, *heat—off—vent—cool.* The schematic wiring diagram of this arrangement is shown in Fig. 1. This original panel was



Switch Pos.	Circuit Closed									
	1	2	3	4	5	6	7	8	9	10
On	•	•	•					•		•
Off				•		•	•			

Fig. 1—Schematic wiring diagram for the original form of control panel



Switch Pos.	Circuit																			
	Open										Closed									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
Cool					•						•	•	•	•		•	•	•	•	•
Vent					•				•	•	•	•	•	•		•	•	•		
Off	•	•	•	•				•	•	•					•	•	•			
Heat				•	•	•	•		•		•	•	•					•		•

Fig. 2—Schematic wiring diagram for the simplified control panel

modified by the manufacturer to have only two positions, *off—on,* as shown by the schematic wiring diagram Fig. 2.

Since the middle of the 1943-44 winter, Car No. 6214 has been equipped with this simplified panel. Now the train crew simply turn to the *on* position at the start of the trip and to the *off* position at the destination. Four thermostats located in the inlet air duct (shown as fresh-air tubes in Fig. 1) automatically determine whether the car is set up for heating, cooling or ventilation.

The *off* position sets the car up for a parking temperature of 60 deg. F., or any other desired temperature. The compressor and blower fan circuits are open. The overhead heat valve is closed and one-half of the floor heat system is under control of the 60 deg. F. thermostat.

With the switch in the *on* position, if the outside temperature is above 60 deg. F., cooling is obtainable provided the car temperature is above the 74 deg. F. setting of the cooling thermostat located in the recirculated air stream. The car is under the control of the cooling thermostat just as it was previously when the switch was in the *cool* position. The cooling thermostat may be either the differential- or fixed-temperature type of control.

When the outside air is below 58 deg. F., but above 40 deg. F., only the overhead heat supply is available and the car is under the control of the two thermal bulbs that are part of the modulating differential overhead heat control valve. Usually this valve tends to maintain a recirculated air temperature of 73 deg. F.; though it may be adjusted to any other desired temperature. When the recirculated air temperature is, for example, 73 deg. F., the discharge air temperature from the overhead heat coil is controlled at 73 deg. F. to establish a balance of the heat input to the car; but when the recirculated air drops to 72 deg. F., the discharge air temperature rises to 75 deg. F. to restore quickly the control temperature to 73 deg. F.

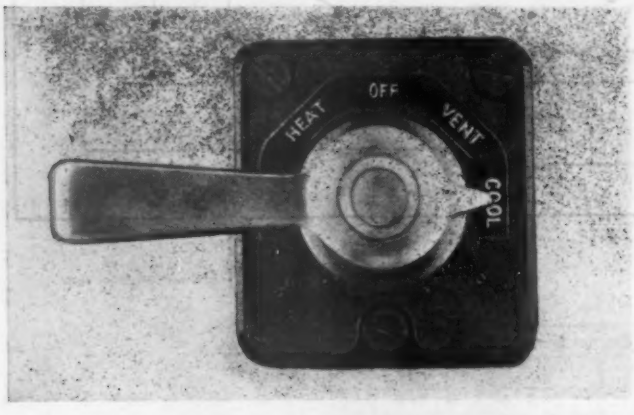
Between 40 deg. F. and 30 deg. F., the overhead heat supply and one-half of the floor heat supply is available

to maintain the car temperature at some value such as 73 deg. F. The overhead heat supply is under control of the thermostat described above and one-half of the total floor heat supply is under control of a 70 deg. F. thermostat tube located in the floor heat thermostat assembly. The available one-half of the floor heat surface will therefore not be used unless the floor heat thermostat is below 70 deg. F.

Below 30 deg. F. the overhead heat supply and the entire floor heat supply is available. The second one-half of the floor heat surface is under control of a 68 deg. F. thermostat tube located in the floor thermostat assembly and this portion of the floor heat will not be used until the temperature at the floor thermostat is below 68 deg. F.

Fig. 4 is a graph showing the results of a test run between New York City and Jacksonville, Fla. On this trip the outside air temperature varied from 44 deg. F. to 79 deg. F. and the recirculated air temperature was constant at 73 deg. F. for all the readings taken on the trip. The car started out set up for cooling and during the night the heat from the overhead heat supply became available, then in the morning the car was back to the cooling set up—all of this without any attention by the train crew.

There is a third position of the switch that is accessible by the use of a key carried by authorized persons. The purpose of this position is to permit testing of the cooling system regardless of the car temperature. In this position the cooling thermostats and cooling relay are shunted out and the compressor runs continuously under the high-low pressure control. Since all failures of any equipment will overheat the car, this one emergency position takes care of practically all emergencies. In nine months of operation, it has not been necessary to use this emergency position.



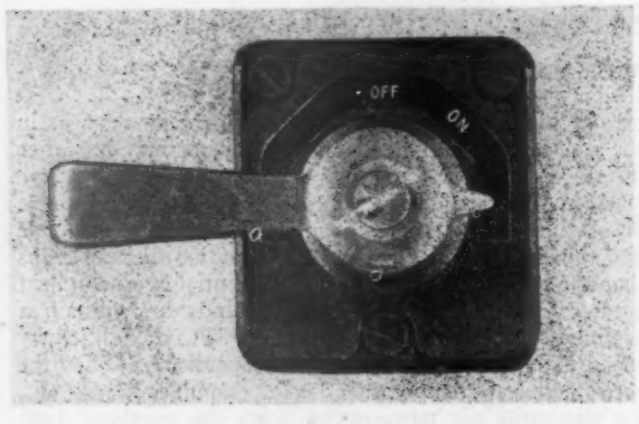


Fig. 3—Above: Control switch used on the original panel—Below: Control switch for the simplified panel

The Seaboard Air Line, because of its north and south travel, frequently encounters conditions where the train crew should operate the control switch several times during one trip. It is probable, however, that railroads operating east and west encounter similar conditions for at least several weeks during the spring and again in the fall of the year, so the simplicity of the system described in this discussion may be pertinent for other railroads.

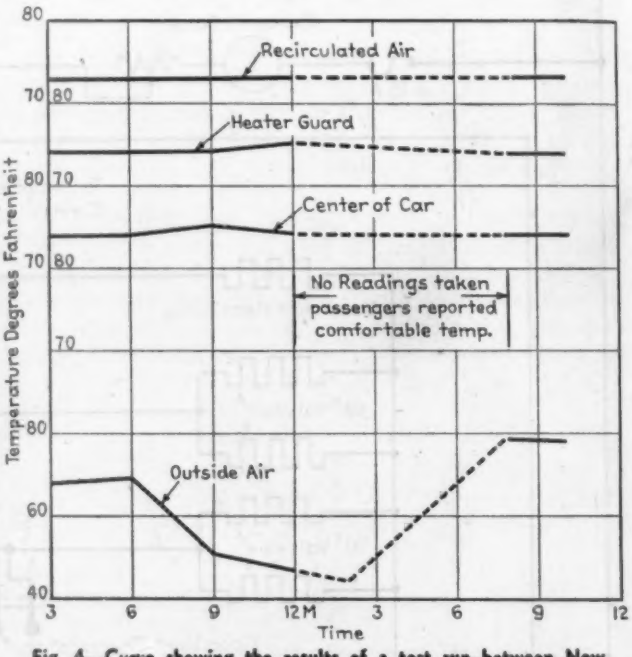


Fig. 4—Curve showing the results of a test run between New York City and Jacksonville, Fla.

The simplified selector control panel described above can also be used in conjunction with modulated or stepped cooling control systems, which are now in operation on several railroads.

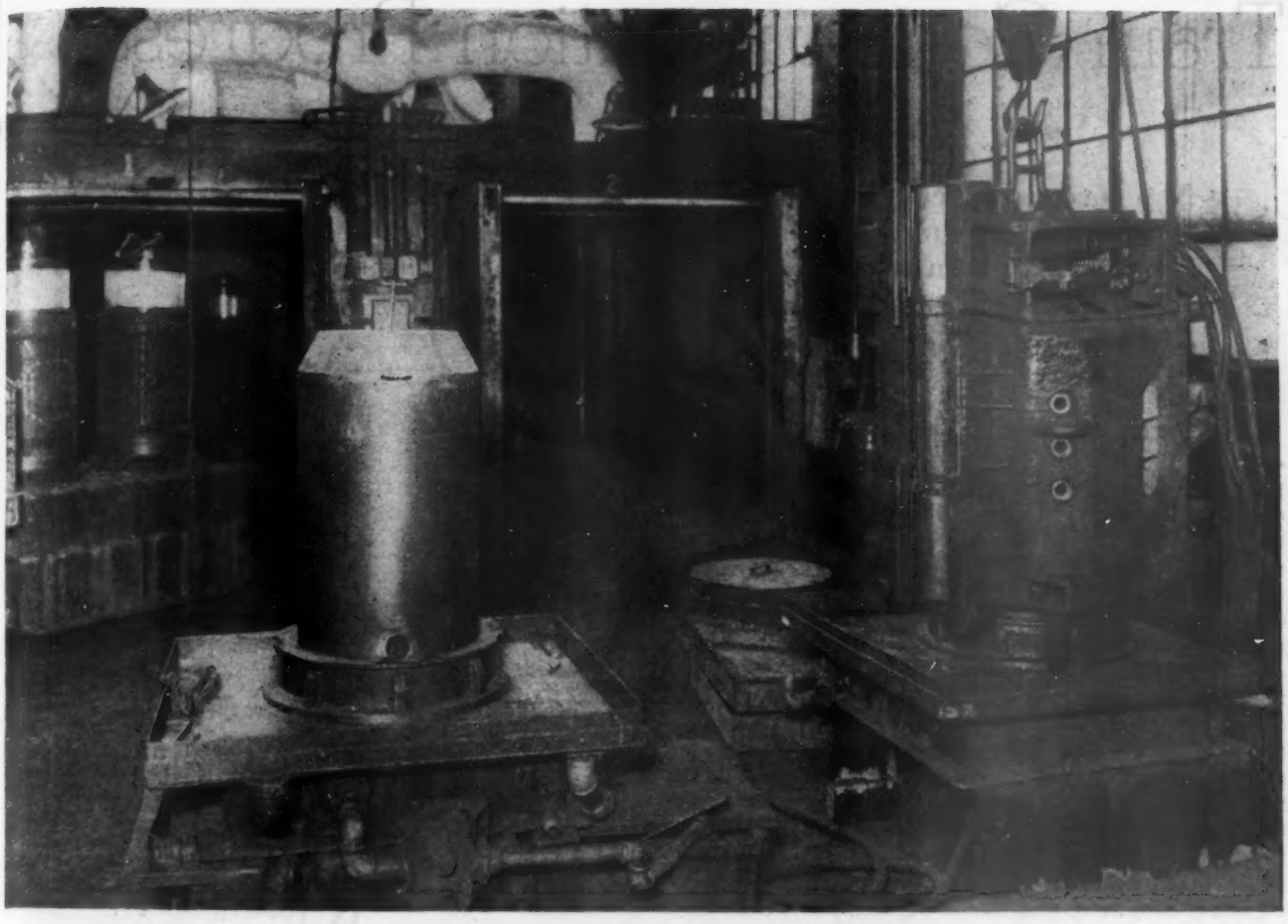
In-Place Dipping and Baking*

The dipping and baking of field coils, both main and commutating, without removal from the motor frame, presents many difficulties. To dip the whole shell means that a great deal of time must be spent with cleaning the exterior as well as the interior, and the New York City Transit System has found a means of eliminating this part of the job by the design of the fixture shown in the illustration.

The shell is dropped down on a rubber seal at the bottom, one or two small drain holes plugged, and then insulating varnish is pumped into the motor frame, flooding the entire interior including all fields. The center drum is used merely to reduce the quantity of insulating varnish required.

After the varnish has had a chance to saturate thoroughly the fields and interior of the frame, a valve at the bottom of the tank is opened and the varnish permitted to drain back into the reservoir. Pole faces are cleaned and the shells are then placed in the ovens shown directly behind those two fixtures and baked at temperatures somewhat lower than usually employed for arma-

* Abstract of a paper by B. F. Cordts, engineer, cars and shops, New York City Transit System, presented at a meeting of the Transportation Group, A. I. E. E., New York, on November 14, 1944.



Two insulating varnish impregnating stands for motor field coils—The one at the left shows the center drum used to reduce the amount of varnish required, and the one at the right shows a motor frame in place

tures to avoid damage to the motor leads which are left connected when this method is used.

The ovens are thermostatically controlled with timers arranged to apply or cut off power for any predetermined periods. Ventilation is also controlled so that any degree of recirculation can be obtained.

Magnet Sweeps Shop Streets

A sweeping magnet portably mounted on a tiering truck is now being used over the miles of streets of the Milwaukee, Wis., shops of the Chicago, Milwaukee, St. Paul and Pacific and is collecting a surprising amount of tramp iron that would damage tires on trucks, automobiles and other vehicles which move materials from building to building. The use of the magnet was initiated by J. V. Miller, manager of stores, who conceived the idea of making the magnet and its power supply easily mountable so that it would not tie up the vehicle to which it is attached, allowing it to be used for other purposes when the streets are not being swept.

The adaptation of the magnet to the vehicle, which is known locally as the doodle-bug, was made by Paul O. Metzelfeld, supervisor of automotive equipment, under the direction of G. A. J. Carr. The engine-driven generator which supplies the power is mounted on skids and is picked up by the vehicle in the same manner that is used for handling freight. The magnet is attached with special hooks and secured with holding clamps. The operating switch shown at the right of the operator is clamped to the generator when the unit is not in use. Similar vehicles are located at other points and when necessary the generator, magnet and switch can be shipped for use at other locations.

The magnet was furnished by Stearns Magnetic Mfg. Co., Milwaukee, Wis.

Street sweeping magnet in use in the Milwaukee shops

Train Communication Progress

New orders placed and the extent of experiments made indicate that train telephones will become a regular part of operating equipment

A SUMMARY of developments in train communication was published in the August, 1944, issue of *Railway Mechanical Engineer*. Since that time, various comments have appeared, describing successively the following installations: The Pennsylvania contracted with the Union Switch & Signal Company to install inductive communication on two main-line four-track divisions covering 245 miles of line between Harrisburg, Pa. and Pittsburgh. The Federal Communications Commission held hearings in Washington, D. C., first, to establish reasons for allocating radio channels to railroads for train communication and other needs, and second, to determine exactly what channels should be allocated to railroad service. The Canadian National tried out radio telephone communication for yard operation, using 50 watt transmitters employing a frequency of 38.6 megacycles. The New York, New Haven & Hartford, in cooperation with the Westinghouse Electric & Manufacturing Company, initiated a series of tests on radio telephone train communication. A 90-mile test run featuring end-to-end train communication was made in France, using two 4-lb. Walkie Talkie sets operated from the C. B. S. Signal Section.

Other recently developed information on train communication, which has not appeared previously in these pages, includes the plans of the Kansas City Southern to install train communication on 560 miles of line between Kansas City, Mo., and Shreveport, La., the Atlantic Coast Line installation to cover 234 miles of line between Rocky Mount, N. C. and Florence, S. C., and recent tests made by the Chicago, Burlington & Quincy in the terminal area in Chicago. Descriptions of these three developments follow:

Map showing location of wayside stations between Kansas City and Shreveport to be equipped for communication with trains

K. C. S. Plans Installation on 550 Miles of Line

Subject to obtaining priorities from the War Production Board and permission from the Federal Communications Commission, the Kansas City Southern has entered into an agreement with Aircraft Accessories Corporation, Kansas City, Mo., to purchase 22 wayside-station sets and enough mobile sets for use on locomotives and cabooses to operate four trains continuously. The plan is to install the wayside sets at the stations shown on the accompanying map on the 560 miles of line between Kansas City, and Shreveport, La. After the benefits of these initial installations have been demonstrated, the plan is to equip the remainder of locomotives and cabooses used in road freight service on this territory.

Beyond Shreveport, the K. C. S. extends south 228 miles to the gulf ports, Beaumont, Tex., and Port Arthur. Also from Shreveport the associated line, the Louisiana & Arkansas, extends west 222 miles to Dallas, Tex., and southeast 312 miles to New Orleans, La. The traffic to and from these three lines is handled over one single-track line between Shreveport and Kansas City, and, therefore, the train communication is planned for this territory first as an aid in increasing track capacity and expediting train movements.

Although telephone apparatus is in service for transmission of train orders on the lines between Shreveport and Port Arthur, the Morse telegraph is still used for train orders north of Shreveport. This is an additional reason for applying the telephone train communication system on the Kansas City-Shreveport territory first, because the system supplies an additional circuit for two-way telephone conversation, by carrier, between the dispatcher's office and the principal stations on the line.

The communication system is of the carrier induction type in which the previously existing wires on the pole line are used also to "carry" the train communication energy which is at 170 kilocycles carrier frequency, using narrow band frequency modulation with unity deviation ratio.

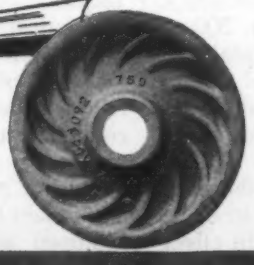
(Continued on next left-hand page)

7 TESTS

that control all member companies' CHILLED CAR WHEELS . . . wherever they are made

THE 7 RIGID TESTS THAT GUARANTEE UNIFORMITY

1. Chill test block taken at least once in every ten wheels poured.
2. One complete chemical analysis with each heat.
3. Constant pyrometer checks for accurate processing temperature.
4. Drop test of finished wheel (A.A.R. Specifications).
5. Thermal test of finished wheel (A.A.R. Specifications).
6. Test for Rotundity.
7. Brinell Hardness test for maximum and minimum chill limits.



All member companies of the Association of Manufacturers of Chilled Car Wheels have their output rigidly tested by Association inspectors. In this manner, the approval of all Chilled Car Wheels is up to impartial resident examiners who release the product only if it meets all of the specifications established as standard for the industry. All this — decidedly unusual in *any* association — is done for the protection of the American Railroads. Thus, a good wheel is standardized wherever it may be made or bought.

AMCCW

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

Organized To Achieve: Uniform Specifications — Uniform Inspection — Uniform Product

Ordinarily the pole line is about 50 ft. from the track, and where the ground is practically level, the line wires are about 15 to 20 ft. above the level of the rails. In rough mountainous terrain in Arkansas, the pole line may be as much as 100 ft. distance from the track, and the line wires may be 50 ft. or more above or below the level of the tracks. The train communication equipment is designed to operate satisfactorily with the line wires up to 200 ft. distance, and 50 ft. above or below the level of the track.

The antenna on the locomotive consists of 12 turns of wire, 4 ft. high and 6 ft. long in a vertical plane, with the greater dimension in the direction of travel. On the caboose, the antenna consists of four turns of wire encircling the outside of the car in the direction of travel.

When transmitting from a mobile unit as, for example, the locomotive of a train, 170-kilocycle energy is applied to the antenna to create a magnetic field which cuts or links with the line wires on the pole line, thereby inducing in the wayside wires the 170-kilocycle energy which is carried along the wires to be picked up by the antenna on the caboose. In this operation the gap between the wires of the pole line and the mobile units is bridged inductively in two instances, and these losses, together with the slight loss along the wires, requires up to 50 watts output for a range of up to 10 miles when transmitting from one train to another train, or from head to rear end of one train.

When transmitting from a wayside office to a locomotive or caboose there is only one gap between the pole line wires and the antenna on the vehicles to be bridged inductively, and therefore only 3 to 6 watts power output is required at the wayside stations for communication with locomotives or cabooses on moving trains up to a maximum distance of 25 miles under adverse weather conditions.

The wayside offices should be spaced not more than 40 to 50 miles apart, thereby making the maximum distance from a mobile unit to a wayside office 20 to 25 miles. The 20 offices on the 560 miles between Kansas City and Shreveport are at the towns shown on the map. The dispatcher at Pittsburg, Kan., handles the 236-mile territory between Kansas City and Watts, Okla. The dispatcher at Heavener, Okla., handles the 197 miles between Watts, Ark., and DeQueen, and the dispatcher at Shreveport handles the 125 miles between DeQueen and Shreveport, in addition to 110 miles beyond.

In this two-way telephone train communication system, the sets of electronic apparatus on the locomotives, cabooses and at wayside stations each include sending as well as receiving equipment designed to operate at 170 kilocycles. The receiver has a sensitivity of approximately 100 microvolts and an audio output of 1 watt (6 watts in mobile equipment). All equipment is designed for frequency modulation with a deviation ratio of unity. The audio response is practically uniform from 200 to 3,000 cycles. The transmitter, also frequency modulated, is the oscillator-amplifier type. The sending and receiving sets for use on the locomotives and cabooses are similar to those used at wayside stations except for shock mounting and for the power output rating.

On the locomotives and cabooses, as well as at the wayside stations, the receiver apparatus is normally in operation and is connected to a loudspeaker, which in effect is used only as a calling device. A hand-set, combining transmitter and receiver, is normally hung on a hook-switch. If the conductor in the caboose, for example, hears a call for him coming in on the loudspeaker he removes his hand-set from the hook-switch. This cuts out the loudspeaker and cuts in the receiver on the hand-set. When he is ready to talk, he operates a small push button on the hand-set which cuts in the transmitter and cuts out the receiver in his hand-set. In order to minimize the confusion, the volume control on the loudspeakers in the cabooses and on the locomotives is adjusted to bring in calls only from the nearest wayside stations.

It is not the intention of the railroad to use the proposed train communication system to change the present practices for authorizing train movements. On the other hand, the new communication will provide supplemental information which, in the opinion of the management, will minimize train delays in numerous instances on each trip, and thus get the trains over the road in less over-all time between terminals, thereby improving service to the public and increasing the efficiency of existing track facilities, cars and locomotives, as well as reducing overtime.

Considering the Kansas City Southern and the Louisiana & Arkansas Lines as a whole, the management estimates that a complete installation, including 65 wayside offices and 270 mobile units, would cost about $500,000. Maintenance, replacements, depreciation and obsolescence is figured as 20 per cent of the original cost annually, so that there would be an annual charge of about $100,000, which would easily be justified by the benefits of the train communication.

In 1943 the railroad paid $1,780,000 for per diem hire of freight cars, and over $500,000 for overtime and constructive allowances to freight train crews, totaling $2,280,000 of which the $100,000 is less than 5 per cent. The management is of the opinion that, by minimizing long delays on extra freight trains, the expenditures mentioned above can be reduced more than $100,000 annually.

234 Miles of Train Communication for the Coast Line

The Atlantic Coast Line has ordered from the Union Switch & Signal Co., Swissvale, Pa., inductive type train communication equipment for six wayside fixed stations and 45 mobile units sufficient to equip all regularly scheduled freight and passenger trains operating over approximately 234 miles of Coast Line system between Rocky Mount, N. C., and Florence, S. C., via Wilmington, N. C., as well as switching locomotives operating over approximately 38 miles of track in South Rocky Mount freight yards.

The line to be equipped comprises a portion of the double-track line from Rocky Mount, N. C., to Contentnea, the important single-track line from Contentnea to Pee Dee, S. C., via Wilmington, and another portion of the double-track main line from Pee Dee to Florence. This line represents an important segment of the Coast Line system, serving military installations at Goldsboro (Seymour Johnson Field), Wilmington (Blumenthal Field and Fort Fisher), Holly Ridge (Camp Davis), and Jacksonville (Camp LaJuene), as well as shipyards and war industries at Wilmington.

In making the announcement of the project, C. McD. Davis, president of the railroad, said, "It is being undertaken to determine the extent to which electronic train communication can increase efficiency of freight and passenger-train operation and supplement existing safety measures, particularly on those portions of the double-track main line included in the installation which are now equipped with automatic block signals and automatic train control. Such increased efficiency of operation will result in expediting movement of military and essential civilian freight and passenger traffic. Subject to the approval of the War Production Board and such approval of Interstate Commerce Commission as may be required,

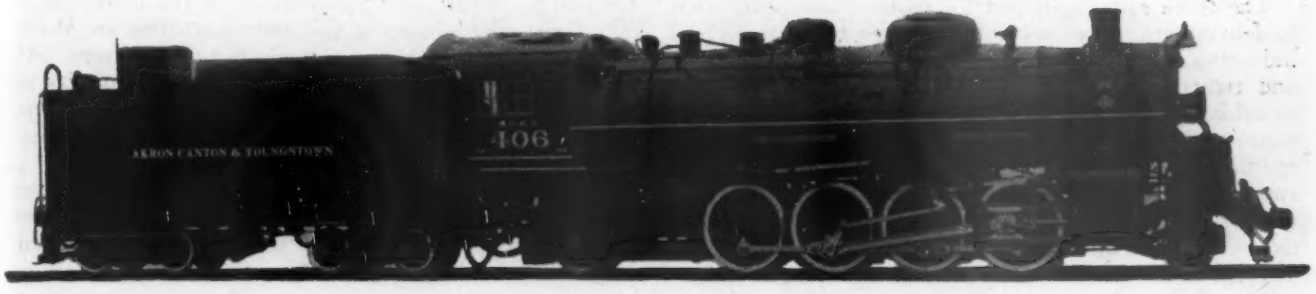
(*Continued on next left-hand page*)

To meet war traffic demands

Akron, Canton & Youngstown

ADDS ANOTHER

LIMA 2-8-2



Serving busy war industry centers in northern Ohio, the A. C. & Y. requires steam motive power capable of moving heavy traffic at high speeds. For this purpose it is utilizing Lima 2-8-2's, and has just added another of these Super-Power Locomotives to its fleet.

LIMA LOCOMOTIVE WORKS — LIMA LOCOMOTIVE WORKS INCORPORATED — INCORPORATED, LIMA, OHIO

Radio equipment in the cab of a Burlington locomotive—Sending and receiving equipment is enclosed in the box marked X

the equipment will be installed as quickly as received from the manufacturer."

Burlington Uses Radio to Direct Switching

A test installation of high-frequency radio has been in service on the Chicago, Burlington & Quincy, since October 28, for two-way telephone service between three Diesel-electric switching locomotives and three offices in the Chicago area. The offices are those of the assistant superintendent at Fourteenth street, the yardmaster at Western avenue, 3.5 mi. west of the Fourteenth street office, and the trainmaster at Morton Park yard, 5 mi. west of Western avenue.

The three radio equipped locomotives are being used to deliver cars to various freight houses, team tracks and industries, as well as to pick up cars at these locations and return them to freight yards. In this service, the switching locomotives are working, for periods of several hours at a time, at points remote from open offices of the railroad. The radio telephone between these locomotives and the three offices has improved switching service to shippers and has increased the utilization of the locomotives. Based on these results, Ralph Budd, president, has directed that as soon as authority and wave length assignments are issued by the Federal Communications Commission, radio communication be installed permanently on a major proportion of Burlington switching locomotives in service in the Chicago area and elsewhere in certain large yards.

These tests in the Chicago switching district follow a preliminary test made on June 15, between a yard office and an instruction car operated between Chicago and Downers Grove, Ill., a distance of 20 mi., and others made between the head-end and rear-end of freight trains operated between Chicago and Denver, Colo., and between Chicago and Kansas City, Mo., during the period from July 1 to September 30.

The radio unit, which sends all messages from three remote offices to the three locomotives, and receives all communications from the locomotives, is located on the fifth floor of a warehouse at Fourteenth street. The units on the three locomotives are located in the cabs. The four units, which were furnished by the Radio Division of the Bendix Aviation Corporation, are V. H. F. type employing amplitude modulation and operating at a frequency of 156.525 megacycles. The input to each unit is 21 watts and the maximum output is 10 watts. The power supply for the fixed unit is public service 110-volt 60-cycle a.c. rectified to the necessary plate and filament energy required by the receivers and transmitters. The power supply for each mobile unit is a 28-volt motor-generator set, fed by the batteries of the locomotive.

The antenna at Fourteenth street, a ½-wave dipole type, is mounted on a 36-ft. steel pole located on the roof of the building at Fourteenth street, or 129 ft. above the ground. It is fed with a coaxial cable extending from the transmitter on the fifth floor. It is a directional beam type, having one reflector and two directors parasitically excited. Because of its location and the ability of the beam to fan out into a cone with a diameter of 15 mi. at a distance of 20 mi., the output of the transmitter is confined to the area in which the locomotives are operated with a resulting strengthening of signals.

The antennae on the locomotives are 36 in. tall and are located 12 ft. from the top of the rail on the front end so that the metal cab will not act as a reflector. They are ½-wave vertical types with a ¼-wave horizontal matching stub. They are fed with coaxial cables.

The unit at Fourteenth street is connected by wire to three remote-control points including the office of the assistant superintendent of the Chicago division, which is located on the first floor of the warehouse containing the radio unit; the office of the yardmaster at Western avenue, 3½ mi. west of the radio units; and the office of the trainmaster at Morton Park, 8½ mi. southwest of the radio unit.

Each of these offices contains a relay switch, a loudspeaker and its amplifying unit and a standard cradle-type telephone set containing a microphone and a receiver. All instruments are connected to the wires from the radio unit at Fourteenth street through the relay switch. This switch activates a relay on the radio unit which throws either the transmitter or the receiver of the unit in circuit with the head set or the loudspeaker. The three microphones at the control stations are Westinghouse Electric & Mfg. Company F-1 transmitters. All loudspeakers are in circuit during idle time so that all can receive calls from the locomotives and other stations. The same equipment and circuits are used in the cabs except that electric-dynamic microphones are employed.

The tests which have been carried on thus far, have been confined to a 15-mi. area but communication has been maintained as far as LaGrange, a distance of 20 mi. They have shown possibilities for speeding up operations by a direct and continuous contact between locomotives and trainmasters and yardmasters.

Increased efficiency of operations resulting from the use of radio is due to the constant contact with the locomotives. Without radio, the only contact while the locomotive is away from its terminal is through the yardmaster, who has to search for the locomotive or through industries which can be prevailed upon in emergencies, to call the engine foreman to the telephone. When radio is employed, the location of and the work being performed by the locomotive can be determined in a few seconds and the engine foreman directed to perform a pick-up at an industry or some other switching operation in the immediate territory.

Sodium Lights Reduce Accidents

The installation of sodium luminaries at twelve grade crossings within the city of Niagara Falls, N. Y., has resulted in an outstanding reduction in night traffic accidents, according to a recent announcement by T. P. Redding, general superintendent of the Niagara Junction Railway Company.

The company, a terminal switching railroad, has 38

(Continued on next left-hand page)

Increased Capacity

FOR FRISCO FASTER FREIGHT 4-8-4's

Franklin Type "E" Locomotive Boosters*

used in both Freight and Passenger Service

Heavy freight and passenger traffic moves fast on the FRISCO, because its 4500 Class 4-8-4 locomotives, used in both kinds of service, have Franklin Type E Boosters.

The Booster saves starting time by providing quicker pick-up. It enables the locomotive to accelerate rapidly to road speed and maintain speed on grades.

By making it possible to haul heavier trains at sustained speeds, it helps to increase the traffic capacity of any line.

These advantages can be secured by any railroad through the application of Franklin Type E Boosters to its locomotives.

*Trade Mark Reg. U.S. Pat Off.

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK • CHICAGO

In Canada: FRANKLIN RAILWAY SUPPLY COMPANY, LIMITED, MONTREAL

miles of track within the city limits. During the four and one-half years prior to lighting, night accidents at nine city and four private grade crossings averaged six a year. In the seven years since the crossings were lighted, this average has dropped to 1.3 a year—despite the fact that train movement has doubled since the start of the war.

Two General Electric Novalux sodium luminaries are used at each crossing, but the yellow light, the company has found, serves as a much stronger caution measure than the flashlight signals alone.

"Our difficulty," said Mr. Redding, "used to be with automobiles running into the side of the train. Motorists had a tendency to ignore the flashlight signals, presumably in the belief that no train was approaching. Since the crossings were not illuminated, freight cars preceding the engine were not visible. Now motorists can easily see approaching trains, which travel over the crossings at a very low rate of speed.

"Our experience with this yellow caution light has been so satisfactory that I would like to see it used universally on highway grade crossings. In fact, I would rather do without the flasher signals than without sodium vapor lights."

CONSULTING DEPARTMENT

Pump Control

Can a reciprocating pump be controlled satisfactorily by means of the usual pressure-responsive devices often used on centrifugal pumps?

Answer is Usually Yes

The query on motor control is too indefinite for a positive reply. However, it is possible to give several yes and no answers. A number of reputable manufacturers make crank-driven pumps which are controlled by pressure-actuating switches. It would appear, therefore, that the answer is yes. In the case of some steam-driven, direct-connected pumps, the answer should be either yes or no, but there would be no advantage in using electric control since a regular steam pressure regulating valve would give better service.

If electrical control of the steam supply of a steam-driven pump were in question, my opinion is that a steam pump governor would be more satisfactory. It is seldom that a steam-driven reciprocating pump needs to come to a complete stop as leaks in the system, or pump, or a low demand for service will allow some movement of the pump. Within reason, this is an advantage since the pump will not lose its suction, the steam cylinder is kept warm and more or less clear of condensation, and the pump governor does not require being kept in perfect repair, and the drop in pressure when large demands for service are met is within practical range. Therefore, if steam is available and is preferred, there is no practical reason for using a more costly and less reliable method of electrical control of that steam supply, and this fact is recognized as electrical controls are mostly confined merely to making and breaking contacts in a power circuit, even though other items are required to make the system, as a whole, operate.

In a general way, the answer could be determined by the following conditions: the starting load must be below the capacity of the circuit breakers, or fuses used, and the motor must attain full speed before the pumping action of the pump plungers can build up the hydraulic pressure. However, if more than one such installation is used and there is a likelihood of simultaneous starting of two or more pumps, the total load of all pumps must be added to such other load as is ordinarily carried.

Another point is that pressure relay switches have a range of from 10 to 15 lb. between the kick-in and the kick-out adjustments. While it is possible to set the two rather close together, such adjustment causes rapid starting and stopping, commonly known as cycling, to occur, resulting in rapid wearing out of the relay and heavy power consumption.

By placing an expansion tank between the line and the pressure-operated valve, the cycling can usually be avoided, though in some instances it may be necessary to use a small orifice between the line and the tank. In this way satisfactory operation usually may be obtained.

LINWOOD SKELLENGER

Can you answer the following question? Answers should be addressed: Electrical Editor, *Railway Mechanical Engineer*, 30 Church Street, New York 7.

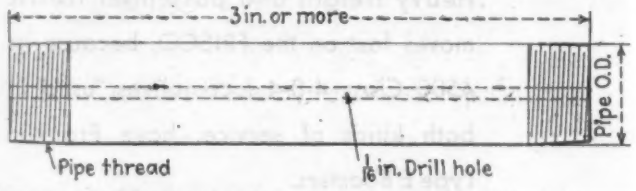
We are planning to rebuild our secondary distribution lines consisting of three-phase, 440 volts, for power and 110-220 volt three-wire, single-phase for lighting. Which would be most economical and efficient over a period of years: secondary racks or cross-arms and pins?

●

Drill Rod Found Effective

As a general rule, we have found that the duty on the control system is more severe with direct acting pumps than with the centrifugal pumps. So much depends on the length of the pipe line to which they are connected that it is almost impossible to give a general statement.

One trick we have worked out may be of interest.

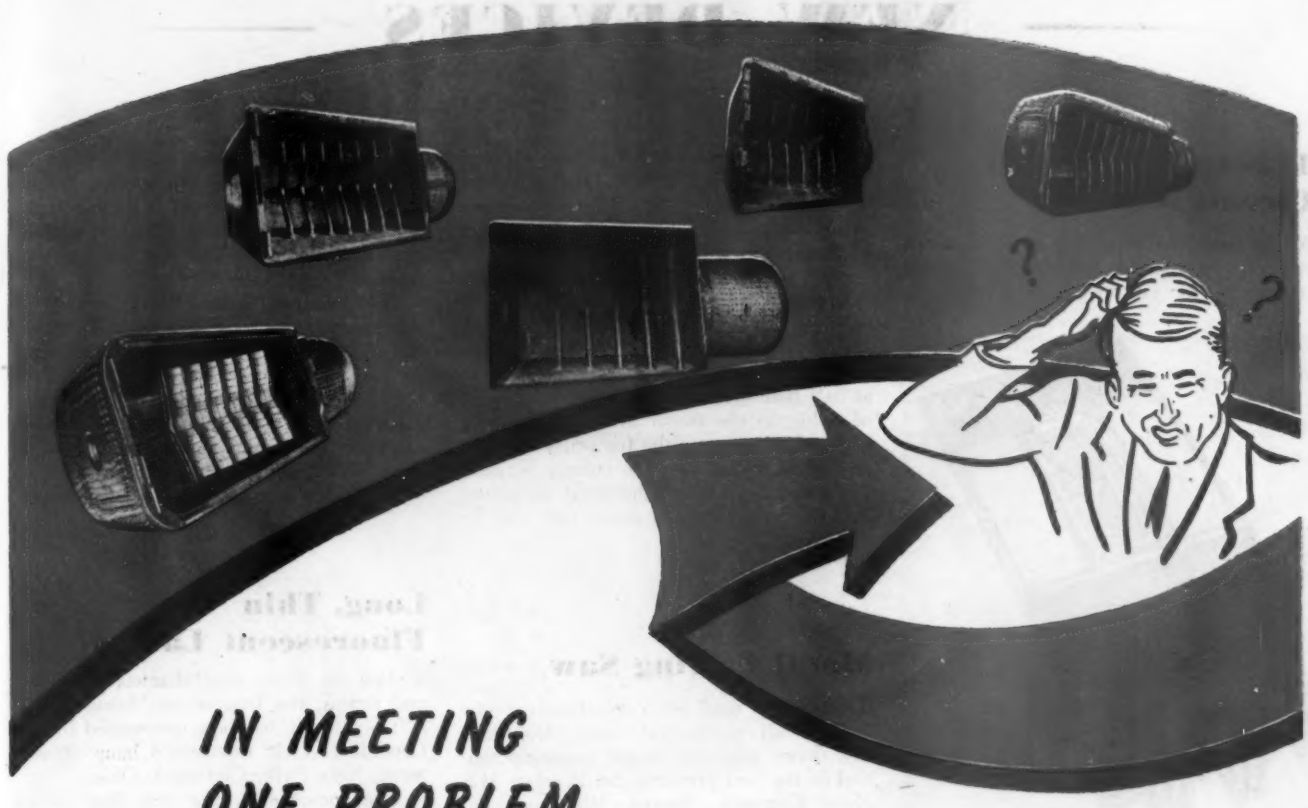


Drill rod with pipe threads at each end which is placed between the air chamber and the control mechanism

Instead of trying to use needle valves or orifice plates, we take a piece of cold rolled steel rod having the same outside diameter as a ¼-in. or ⅜-in. pipe, cut a pipe thread on each end and then drill a 1/16-in. hole. If this choke or nipple is made about 3 in. long, and the air chamber connected to it and in turn to the control mechanism, this scheme does a very good job of cutting off these surges and pulsations.

JOHN M. DRABELLE

(*Turn to next left-hand page*)



IN MEETING ONE PROBLEM

SECURITY CIRCULATORS

HAVE SOLVED SEVERAL OTHERS

THE demand for greater boiler horsepower, in the modern steam locomotive, has led to the construction of larger fireboxes. This in turn presented a problem of brick arch support, to meet which Security Circulators were primarily developed.

Security Circulators may be installed in any locomotive and permit the use, in any type of firebox, of a 100% arch, for which they provide the ideal support.

In addition to this, Security Circulators give the positive protection of a continual flow of water over the center of the crown sheet. Security Circulators also improve circulation in side water-legs.

Furthermore, Security Circulators tend to reduce honeycombing, flue plugging and cinder cutting.

AMERICAN ARCH COMPANY, INC.

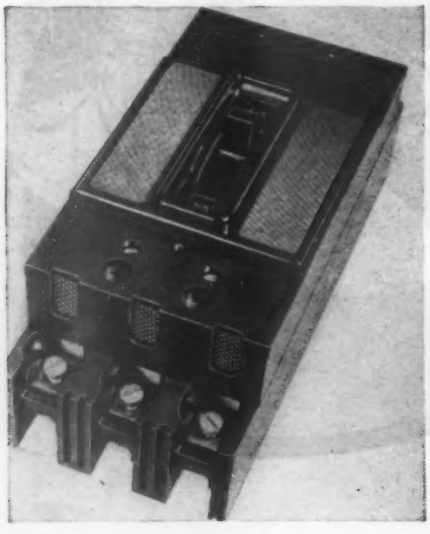
NEW YORK • CHICAGO

SECURITY CIRCULATOR DIVISION

NEW DEVICES

110-Amp. Circuit Breaker

A 100-amp. De-ion circuit breaker which requires less space and permits lighter structures for distribution panelboards,



Fuseless circuit breaker rated at 100 amp. which fits mounting space of former 50-amp. breakers

built-in applications and bus duct plug-ins is announced by Westinghouse Electric & Manufacturing Company.

All ratings are available in one compact breaker with uniform pole spacings and terminal arrangement, providing complete interchangeability between ratings. The new F frame permits for the first time a 100-amp., 600-volt a. c. or 250-volt d. c. breaker in the same space formerly required by the 50-amp., 600-volt a. c. or 250-volt d. c. rating.

Equipped with thermal and instantaneous magnetic trip elements, the fuseless circuit breaker permits maximum loading of circuits and fast resumption of interrupted service. Contact pressure increases with wear, thereby prolonging the life of contacts and breaker. Silver alloy contacts give increased contact life with lower wattage loss. The special alloys used also permit "freezing". Both two and three-pole units are available.

Power Supply For Passenger Cars

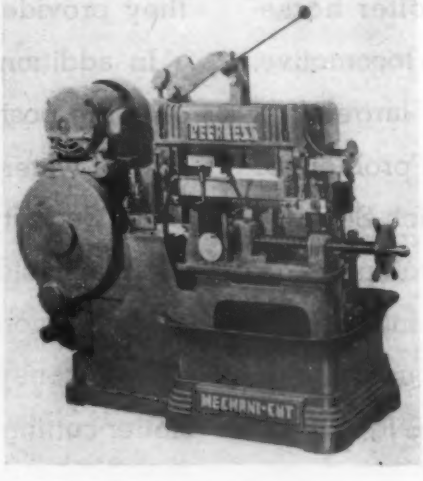
An axle-driven generator has been developed by the Westinghouse Electric & Manufacturing Company to supply the necessary power for railway passenger cars. The generator is a 76-volt machine designed to serve a 64-volt car power system. Light weight and small size are achieved in part by high speed; 4,000 r. p. m. at 120 m. p. h. Built into the generator frame is an a. c. motor to drive the generator when the train is standing in terminals. Also the separate motor permits testing of the system without moving the car.

To provide alternating current for fluorescent car lighting a new lightweight motor-generator set has been developed. Rated at 4 kw. at 3,600 r. p. m. it is no larger than the earlier 2-kw. sets that ran at half that speed. By a new arrangement of fields on the motor and the generator it is possible to hold the frequency between 58 and 62 cycles, and the voltage between 110 and 125 volts for the great variations in load and battery voltage that can be expected.

Metal Cutting Saw

To meet the need for a metal-cutting saw having full mechanical drive, four-sided saw frame performance and finger-tip control of the feed pressure, the Peerless Machine Company, Racine, Wis., has developed the new Mechani-Cut model illustrated. This saw is designed to cut at higher speeds with unusual precision and is convertible to manually operated conveyor operation right on the job. It is available in capacities of 7 in. by 7 in., 11 in. by 11 in. and 14 in. by 14 in.

A new feature of the Mechani-Cut is the compensation feed unit. A highly-sensitive rack-and-pinion feed compensates for



Peerless mechanically driven metal-cutting saw

hard spots in the work and varying shapes and types of stock. This feed unit is mounted away from falling chips and coolant spray. Pressures are set by fingertip control and are adjusted to a fraction of a pound.

A massive four-sided saw-frame surrounds the blade and the work and permits locating bearings above and below the saw-blade. Hardened and ground renewable inserts take all strain and wear as the saw frame reciprocates, giving sustained cutting accuracy at low cost for years of service.

The Peerless backing-plate, locked 1/32 in. above the saw blade, gives added rigidity and permits maximum cutting pressures without undue injury to the blade. Precision built and assembled, the Peerless Mechani-Cut promises long, continuous operation with minimum attention and is intended to meet present needs as well as being readily adaptable to post-war work.

Long, Thin Fluorescent Lamps

A line of four small-diameter fluorescent lamps, the longest unit being nearly 8 ft. in length, has been announced by the General Electric Company's lamp department, Nela Park, Cleveland, Ohio.

Also included in the new line, called Slimline Mazda fluorescent lamps, are two ¾-in. in dia. sizes, one approximately 3½ ft. long, the other slightly more than 5 ft. in length, and another 1-in. in dia. lamp approximately 6 ft. long.

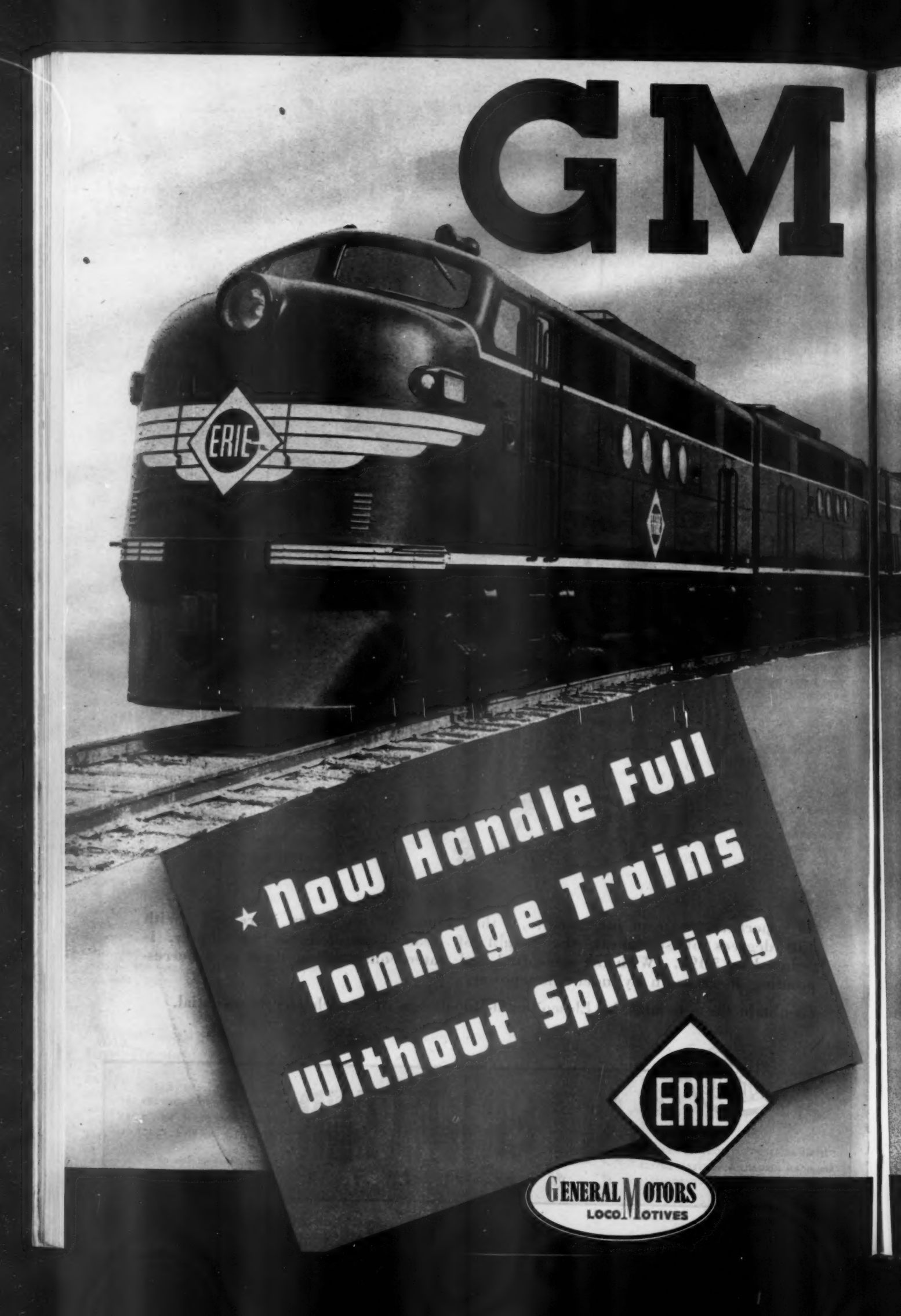
All four lamps will be of the instant starting type, none of which will require starters. A feature of the new lamps is that, for the first time, hot cathode fluorescent lamps are recommended for operation at more than one wattage and current value. Each of the new lamps will have a single pin base, will be of hot cathode design, and initially will be furnished in white color only. At their present stage of development, the new slim lamps have an estimated life rating, at 200 ma. operation, equal to that of the 40-watt F lamp, namely, from 2,500 to 6,000 hr., depending on frequency of starting. Initial efficiency of the new G-E Slimline Mazda F lamps averages approximately 60 lumens per watt. This light output is considerably more than that of the standard F lamp. Current and lumen data for the new lamps is as follows: lows:

Lamp*	Current ma.	Lumens (approx.)
42T6	100	900
	200	1,400
64T6	100	1,400
	200	2,200
72T8	100	1,500
	200	2,300
96T8	100	1,900
	200	3,000

A limited number of samples of 42T6 and 64T6 lamps for design purposes are now available and samples of 96T8 lamps will be provided as soon as manufacturing conditions permit.

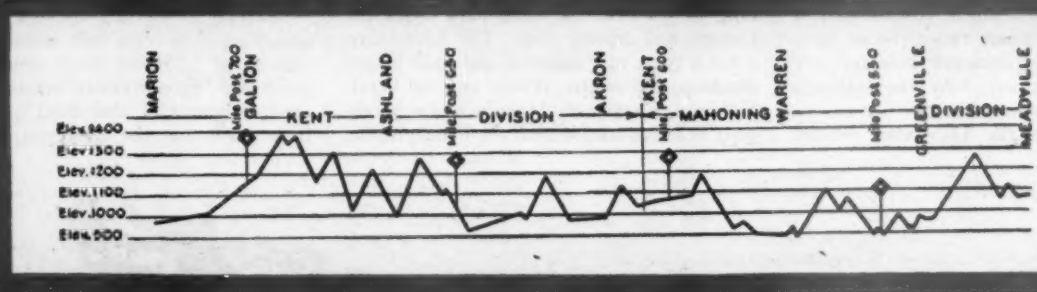
* First two numerals indicate nominal length in inches. Last number designates diameter in eighths of an inch. Nominal length includes one lamp plus two multiple sockets. When series sockets are available, the increase in over-all length will be announced.

(*Turn to second left-hand page*)


GM
ERIE
★Now Handle Full
Tonnage Trains
Without Splitting
ERIE
GENERAL MOTORS
LOCOMOTIVES

Diesels

CONQUER HEAVY GRADES ON TWO *Erie Divisions*



Six General Motors 5400 H. P. Freight locomotives have gone into service on the Erie to conquer the steep grades and to alleviate traffic bottle-necks on the Kent and Mahoning divisions. No longer will it be necessary to split eastbound freights at Marion and westbound trains at Meadville and tie them together again a few hours later. Diesel operation will mean that for the first time a solid train with full tonnage can be run from one end of the line to the other without splitting it up at intermediate terminals on account of grade changes—a big saving in time and serious traffic delays.

★ ***ON TO FINAL VICTORY – BUY MORE WAR BONDS*** ★

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS CORPORATION LA GRANGE, ILLINOIS, U.S.A.

NEWS

Equipment Builders May Exceed Schedules

BUILDERS of railroad cars and locomotives may produce such equipment in advance of their production schedules, after giving the War Production Board notice that conditions permit manufacture ahead of schedules, W.P.B. has announced. The authorization appeared in amendment to Orders 1-97 and L-97a effective November 25, 1944.

Subject to the condition that sequence of production established in schedules must be maintained, the manufacturer may proceed with such advance production provided it does not interfere with other schedules, it was explained, unless he is otherwise directed, in writing, by the W.P.B.

R. V. Fletcher Becomes A.A.R. Research Head

R. V. FLETCHER, vice-president of the Association of American Railroads, has been named vice-president-research.. Mr. Fletcher, who has been chairman of the Railroad Committee for the Study of Transportation since 1942, heads the new research department and will co-ordinate all research activities of the various divisions of the Association. Under the original plan of organization of the A.A.R., which provides for the creation of the research department headed by a vice-president, research activities will be divided into two divisions, technical research and economic research, and the vice-president will have the authority to employ a director of each.

Present plans of the Association provide for the completion of the study of economics by the Railroad Committee for the Study of Transportation, which has been active since 1942, rather than by the new division.

More Advance Orders Sought by Locomotive Builders

LOCOMOTIVE builders represented by the Industry Advisory Committees of the War Production Board have informed that agency that orders for new locomotives, including foreign requirements, must be placed immediately if full advantage is to be taken of available manufacturing capacity. Present W.P.B. production schedules for large locomotives (that is, over 100 tons) are projected only through the second quarter of 1945, it was explained, and emphasis was put on the dangers in such a situation, both in loss of manpower to other industries and in delays in placing orders for and obtaining deliveries of components, such as injectors, superheaters, and feed water pumps, whose manufacturers must know the builders requirements well in advance.

Steam Turbine Locomotive for Pennsylvania

THE Pennsylvania has completed a coal-burning steam locomotive powered by a turbine in place of the customary cylinders, pistons, and driving rods. The locomotive, a 6-8-6 type, was designed and built by the Baldwin Locomotive Works and the Westinghouse Electric & Manufacturing Company in collaboration with the Pennsylvania.

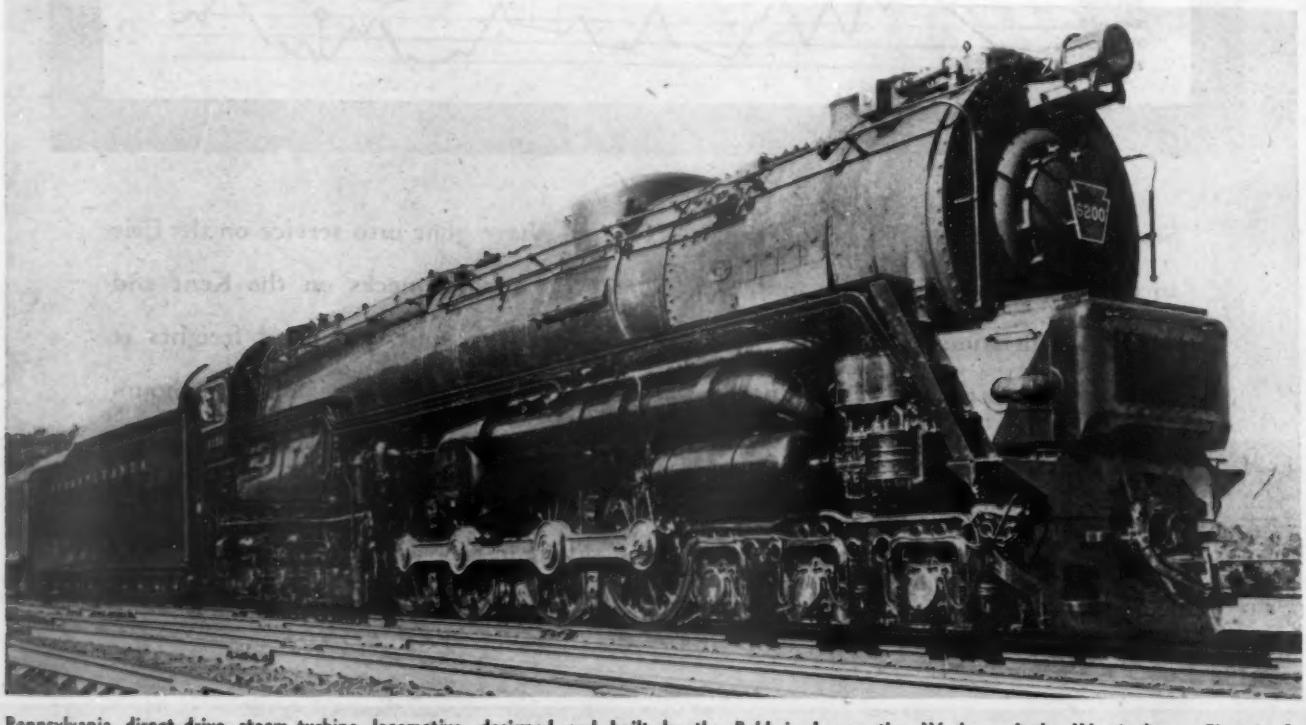
Two turbines are mounted transversely between the No. 2 and No. 3 pairs of driving wheels, both of which are quill-driven through reduction gearing. The main turbine for forward motion, on the right-hand side, is 3 ft. 9 in. in diameter and is always in gear. The smaller, backward-motion turbine, mounted on the left side, is brought into operation by engaging a clutch. The horsepower rating of the main turbine is 6,500 at 9,000 r.p.m. and is designed to develop a maximum of 6,900 shaft horsepower.

The operation of the locomotive, both in forward and backward motion, is controlled by the movement of a single lever. This operates through specially designed pneumatic control apparatus which automatically interlocks the reversing sequence so that the locomotive cannot be reversed until it has come to rest and steam cannot be admitted to the reverse turbine until the clutch is in mesh.

The total engine weight is 582,700 lb., of which 260,000 lb. are on the drivers. The driving wheels are 68 in. in diameter and the boiler pressure, 310 lb. per sq. in. The tender carries 37½ tons of coal and 18,000 gallons of water.

First Quarter Steel Allotments Include Passenger-Car Materials

MATERIALS for the construction of 105 passenger-train cars are included in allocations of 1,254,838 short tons of carbon steel and "proportionate amounts of alloy steel, copper and aluminum," which have been made for the first quarter of 1945



Pennsylvania direct-drive steam-turbine locomotive, designed and built by the Baldwin Locomotive Works and the Westinghouse Electric & Manufacturing Company in collaboration with the railroad

by the War Production Board to the Office of Defense Transportation, as claimant agency for domestic transportation under the Controlled Materials Plan. Freight car materials have been made available for the construction of "up to a maximum of 2,300 box cars," while 507,000 tons of carbon steel have been allocated for replacement rails.

The 105 passenger-train cars are "now on schedule," the O.D.T. announcement said, adding that "the balance of O.D.T.'s program of 250 cars per quarter will be started as soon as governmental authorities approve the manpower requirements." The 105 will be "chiefly day-coaches, with some baggage, mail and express cars."

The allocations for the 2,300 box cars were contingent upon the placement of orders by the railroads with car builders by December 1.

Meanwhile carbon-steel requirements for locomotives were also met "with amounts sufficient to cover production schedules."

In addition to the direct allocations, the W.P.B. set aside what the O.D.T. announcement called "an adequate reserve for railroad and local transit maintenance, repair and operating supplies."

Cornell Becomes Director of W.P.B. Equipment Division

GEORGE M. CORNELL, deputy director of the Transportation Equipment Division, War Production Board, has been appointed director of the division, succeeding C. B. Bryant. Mr. Bryant returned on November 18 to the Southern where he is assistant to vice-president, in charge of research and tests. He had been on **leave of absence** since July 1 for the W.P.B. assignment.

Officers of A. S. M. E. Railroad Division for 1945

DURING the annual meeting of the American Society of Mechanical Engineers, held at the Hotel Pennsylvania, New York, a joint session of the Railroad Division and the Oil and Gas Power Division was held on November 29 at which the subject of discussion was the gas-turbine locomotives. Two sessions of the Railroad Division were held on November 30 on locomotive and car subjects, at which the chairman of the Railroad Division, John G. Adair, mechanical engineer, Bureau of Locomotive Inspection, Interstate Commerce Commission, Washington, D. C., presided. At the close of the afternoon session R. M. Gates, president of the society, presented a certificate of appreciation to Mr. Adair and complimented the Railroad Division on its achievements and opportunities for further service to the railroad and railway supply industries.

Officers of the Railroad Division for 1945, including those newly appointed, are as follows: Executive Committee—Chairman, W. M. Sheehan, assistant vice-president, General Steel Castings Corporation, Eddystone, Pa.; K. F. Nystrom, mechanical assistant to vice-president, Chicago, Milwaukee, St. Paul & Pacific, Milwaukee, Wis.; W. C. Sanders, general manager, Railroad Division, Timken Roller Bearing Company, Canton, Ohio; B. S. Cain, assistant engineer, Locomotive Division, General Electric Company, Erie, Pa.; secretary, E. L. Woodward, western mechanical editor, *Railway Mechanical Engineer*. Mr. Sheehan will also serve as chairman of the General Committee on which L. B. Jones, engineer of tests, Pennsylvania, Altoona, Pa., was re-elected for another period of five years. Fred Huston, International Nickel Company, New York, was elected to fill the unexpired term of Mr. Cain who was advanced to the Executive Committee. Two additional new members of the General Committee elected for five-year terms included C. E. Pond, assistant to superintendent of motive power, Norfolk & Western, Roanoke, Va., and C. H. Beck, general sales manager, Westinghouse Air Brake Company, Wilmerding, Pa.

Orders and Inquiries for New Equipment Placed Since the Closing of the December Issue

LOCOMOTIVE ORDERS

Road	No. of locos.	Type of loco.	Builder
Atchison, Topeka & Santa Fe	1[1]	1,000-hp. Diesel-elec.	Fairbanks, Morse & Co.
	10[2]	5,400-hp. Diesel-elec. frt.	Electro-Motive
Aroostook Valley	2	380-hp. Diesel-elec.	General Electric Co.
Canadian Pacific	30	4-6-2	Montreal Electric Wks.
	13	Diesel-elec. switch.	American Loco. Co.
Chicago & Eastern Illinois	4	1,000-hp. Diesel-elec.	American Loco. Co.
Chicago & North Western	7	1,000-hp. Diesel-elec.	Baldwin Loco. Wks.
	10	660-hp. Diesel-elec.	Baldwin Loco. Wks.
Chicago, St. Paul, Minneapolis & Omaha	2	1,000-hp. Diesel-elec.	Baldwin Loco. Wks.
	3	660-hp. Diesel-elec.	Baldwin Loco. Wks.
Detroit Terminal	2	1,000-hp. Diesel-elec.	Baldwin Loco. Wks.
Kentucky & Indiana Terminal	2	1,000-hp. Diesel-elec.	Baldwin Loco. Wks.
Minneapolis & St. Louis	2	4,050-hp. Diesel-elec.	Electro-Motive
Minneapolis, St. Paul & Sault Ste. Marie	2[3]	1,000-hp. Diesel-elec.	American Loco. Co.
Pacific Great Eastern	2[4]	2-8-2	Canadian Loco. Co.
St. Louis-San Francisco	7	1,000-hp. Diesel-elec.	Baldwin Loco. Wks.
St. Louis Southwestern	7	1,000-hp. Diesel-elec.	Baldwin Loco. Wks.
	2	5,400-hp. Diesel-elec. frt.	Electro-Motive
Southern	2	5,400-hp. Diesel-elec. frt.	Electro-Motive
	7	1,000-hp. Diesel-elec.	American Loco. Co.

FREIGHT-CAR ORDERS

Road	No. of cars	Type of car	Builder
Atchison, Topeka & Santa Fe	500	50-ton auto-box	Pullman-Standard
Central of Georgia	100	50-ton pulpwood	Greenville Steel Car
Chesapeake & Ohio	990	50-ton box	Pullman-Standard
Chicago & North Western	500	70-ton hopper	Pullman-Standard
	500	70-ton hopper	General American
	750	70-ton gondola	Bethlehem Steel
	250	70-ton ballast	American Car & Fdry.
	100[5]	50-ton hopper	Mt. Vernon Car
	400[5]	50-ton box	American Car & Fdry.
Erie	500	50-ton box	American Car & Fdry.
Lehigh Valley	15	Caboose	Co. shops
Minneapolis & St. Louis	500	50-ton box	General American Trans.
Monongahela Connecting	50	120-ton gondola	Co. shops
New York Central	1,000[6]	70-ton gondola	Dispatch Shops
	2,000[7]	Box	Dispatch Shops
	2,000[7]	Box	American Car & Fdry.
New York, Chicago & St. Louis	500[8]	50-ton box	Ralston Steel Car Co.
St. Louis-San Francisco	50	70-ton hopper	Co. shops

FREIGHT-CAR INQUIRIES

Baltimore & Ohio	500	50-ton auto box
Chicago & Eastern Illinois	500	50-ton hopper
Erie	500	50-ton box
Fruit Growers Express	125	40-ton refrigerator
Great Northern	250	70-ton flat
St. Louis Southwestern	25	Covered hopper
Toledo, Peoria & Western	50	Box
Western Maryland	100	50-ton box
Western Fruit Express Co.	175	40-ton refrigerator

PASSENGER-CAR ORDERS

Road	No. of cars	Type of car	Builder
Great Northern	5	Bagg.-mail	Pullman-Standard
	20	Coaches	Pullman-Standard
	5	Diners	Pullman-Standard
	5	Dormitory-coffee shop	Pullman-Standard
	15[9]	Sleeping	Pullman-Standard
	5[9]	Obs.-bedroom-lounge	Pullman-Standard
Minneapolis & St. Louis	6[10]	Coaches	Edw. G. Budd
Northern Pacific	36[11]	64-pass. coaches	Pullman-Standard
Wabash	1[12]	Bagg.-mail	American Car & Fdry.
	1[12]	Baggage	American Car & Fdry.
	1[12]	Coach	American Car & Fdry.
	1[12]	De luxe coach	American Car & Fdry.
	1[12]	Coach-buffet	American Car & Fdry.
	1[12]	Parlor-obs.	American Car & Fdry.
	1[12]	Dining	American Car & Fdry.

PASSENGER-CAR INQUIRIES

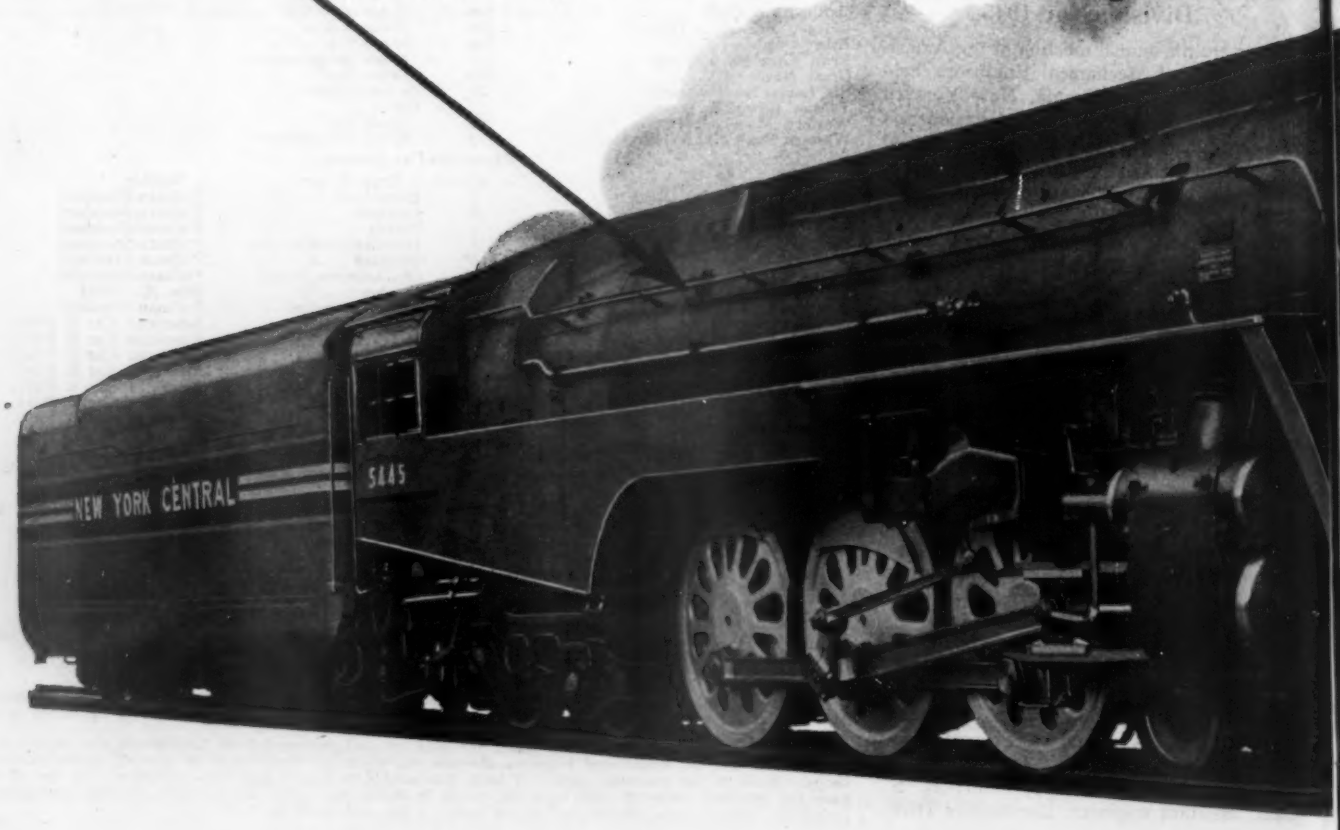
Canadian Pacific	10[13]	Bagg.-exp.

[1] For delivery in February, 1945.
[2] When these and other locomotives now on order are delivered the Santa Fe will have a fleet of 78 5,400-hp. Diesel-electric freight locomotives.
[3] For service on the Duluth, South Shore & Atlantic.
[4] For delivery in May, 1945.
[5] For Chicago, St. Paul, Minneapolis & Omaha.
[6] For the Pittsburgh & Lake Erie.
[7] The 4,000 box cars will cost $13,000,000.
[8] For delivery during second quarter of 1945.
[9] Will not be purchased if the Pullman Co. can supply the sleeping cars when the other cars are delivered.
[10] Stainless steel, air conditioned.
[11] Lightweight de luxe coaches of alloy-steel construction.
[12] For one lightweight train. A Diesel locomotive for the train has been ordered from Electro-Motive. If materials are released promptly by the W. P. B., the train, which it is estimated will cost $900,000, will be delivered late in 1945.
[13] The Canadian Pacific also has asked for bids on steel frames for 35 lightweight air-conditioned coaches and five air-conditioned roomette sleepers on which the finish will be applied at the Angus shops. Each of the roomette cars will have five double bedrooms and ten roomettes. In the daytime the enclosed roomette will be made up as a single seat with all facilities for the passenger, including baggage rack, clothes locker, ice water, toilet and wash basin.

(Turn to second left-hand page)

FOR THE ROCK ISLAND, American Locomotive and General Electric built four 2,000 h.p. Diesel-electrics—locomotives now pulling such famous trains as the "Choctaw Rocket" from Memphis to Amarillo and the "Golden State Limited" from Chicago to Kansas City.

Each is unsurpassed for the job



FOR THE NEW HAVEN, American Locomotive and General Electric built 30 dual-purpose 2,000 h.p. Diesel-electrics like this one. Working in pairs as a 4,000 h.p. unit, these Alco-GE engines make four trips daily between Boston and New Haven—powering two passenger trains by day and two freight trains by night.

because each was built for the job!

FOR THE NEW YORK CENTRAL, American Locomotive built the powerful, streamlined Hudson-type steam locomotives that pull the famous 20th-Century. Operating between New York and Chicago, these locomotives have helped these trains set new standards in speed, comfort and convenience.

American Locomotive

NEW YORK

Supply Trade Notes

CARNEGIE-ILLINOIS STEEL CORPORATION; LUKENS STEEL COMPANY.—The Carnegie-Illinois Steel Corporation (subsidiary of the United States Steel Corporation) has announced that the Lukens Steel Company has been licensed to manufacture "Cor-Ten", a corrosion-resistant high strength, low alloy steel which was developed by Carnegie-Illinois and, up to the present time, has been produced solely by subsidiary companies of U. S. Steel.

◆

PULLMAN-STANDARD CAR MANUFACTURING COMPANY.—*Lloyd E. Huber,* for the past twenty-one months senior purchasing officer, car section, transportation corps, War Department, has been appointed sales

Lloyd E. Huber

agent of the Pullman-Standard Car Manufacturing Company and the Pullman-Standard Car Export Corporation, with headquarters in Washington. Prior to his appointment with the transportation corps, Mr. Huber was supervisor of priorities in the purchasing department of the Baltimore & Ohio, with which railroad he had been associated in various capacities in the stores and purchasing department since 1913.

◆

SUN OIL COMPANY.—*Dr. Edgar S. Ross* has returned to the Sun Oil Company at Philadelphia, Pa., where he will devote his full time to the development of technical sales with the industrial products department. For fifteen months, Dr. Ross had been chief of the lubricants section, aviation division, Petroleum Administration for War, Washington, D. C. Prior to serving with the P. A. W., he was assistant manager in charge of specialties, development division, for the Sun Oil Company at Marcus Hook, Pa.

◆

AMERICAN CAR AND FOUNDRY COMPANY.—*William L. Stancliffe,* vice-president of American Car and Foundry Company, at his own request, has retired from active service as head of its sales department. Mr. Stancliffe will remain with the company in a consultative capacity and will continue as a member of its board of directors. —*Justus W. Lehr* has been appointed district manager in charge of the American Car and Foundry Company plant at Chicago. *Preston J. Gearhart* has been appointed assistant district manager at Berwick, Pa.

◆

AMERICAN WELDING & MANUFACTURING COMPANY.—*Edward C. Fales,* assistant to the general manager of operations of the Sylvania Electric Products Company, has been appointed assistant to the president of the American Welding & Manufacturing Co., Warren, Ohio.

◆

CARBOLOY COMPANY, INC.—*A. F. Dobbrodt* has been appointed district manager of the Pittsburgh district office of the Carboloy Company at 704 Second avenue, Pittsburgh, Pa. Mr. Dobbrodt was previously district manager of the Southern district office at Birmingham, Ala. The Southern territory will now be handled from the Pittsburgh office.

◆

AMERICAN STEEL & WIRE COMPANY.—*C. E. Plass,* chief research engineer of the electrical cable works at the American Steel & Wire Company's South Works in Worcester, Mass., has been appointed district engineer in the electrical sales division of the company's Chicago office. *Victor Siegfried,* an instructor in electrical engineering at Worcester Polytechnic Institute since 1933, has been appointed to succeed Mr. Plass as chief research engineer of the electrical cable works.

◆

H. K. PORTER COMPANY.—The H. K. Porter Company, of Pittsburgh, Pa., has filmed a 16 mm. sound Kodachrome motion picture titled "Custom Built Power," which depicts the building of a 100-ton Diesel-electric switching locomotive. Presenting a comparison of locomotive and fashion changes from 1866 to the present, the film is a panorama of locomotive progress in the past 80 years together with major details of interest in the construction of the 100-ton Diesel. "Custom Built Power" has a showing time of 20 min., to which Porter will add from its film library, additional special films of interest to any particular group, providing a 40-min. show in all. George L. Phillips, public relations manager, is in charge of showings which are available on request.

Army-Navy "E" Awards

Babcock & Wilcox Company, Bayonne, N. J.

Buffalo Forge Company, Buffalo, N. Y Third renewal.

Carboloy Company, Inc., Detroit, Mich.

Fansteel Metallurgical Corporation, Tantalum Defense Corporation, North Chicago, Ill. Second star.

Westinghouse Electric & Manufacturing Company, Sharon, Pa. Fourth star.

BLAW-KNOX COMPANY.—*J. B. Kintner,* manager of sales for the Union Steel Castings division of the Blaw-Knox Company, has been promoted to vice-president of the division.

◆

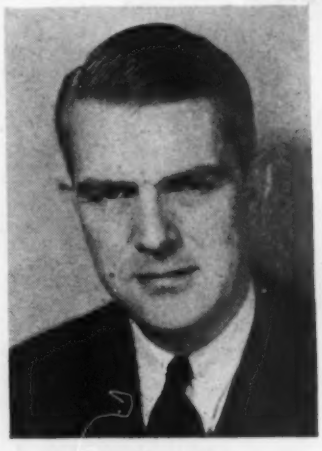
GREAT LAKES STEEL CORPORATION.—*J. Emmett Fink,* general works manager of the Great Lakes Steel Corporation, Detroit, Mich., has been elected vice-president in charge of operations and *Julius A. Clauss,* chief engineer, has been elected vice-president in charge of engineering.

◆

RELIANCE ELECTRIC & ENGINEERING COMPANY.—*James W. Corey,* sales vice-president since 1940 of the Reliance Electric & Engineering Co., Cleveland, O., has been elected president, to succeed *Clarence L. Collens.* Mr. Collens, who had served as president of the company for 37 years, has been elected to the newly-created position of chairman of the board.

◆

EDWARD G. BUDD MANUFACTURING COMPANY.—*Goodrich K. Murphy* has been appointed district sales manager of the Edward G. Budd Manufacturing Company. Mr. Murphy will make his headquarters in the company's New York offices, working with Fitzwilliam Sargent, regional sales manager in New York, and Samuel M. Felton, general sales manager of the railway sales department at Philadelphia, Pa. Mr. Murphy was graduated from Yale University. He formerly was associated with the Matson Navigation Company, where he



Goodrich K. Murphy

was assistant to the vice-president. Prior to his employment with Matson, he was with the New York, New Haven and Hartford for ten years holding successively the positions of assistant to the passenger traffic manager, assistant passenger traffic manager, and assistant to the general manager. Before joining the New Haven, he was with the American Airlines, Inc., for six years until 1934, at which time he was eastern division traffic manager.

NATIONAL MALLEABLE & STEEL CASTINGS COMPANY.—*Howard W. Gilbert,* manager of the inspection and test department of the National Malleable & Steel Castings Company since 1918, has been promoted to engineering assistant to the president. Mr. Gilbert joined National Malleable in 1908. He was chairman of the mechanical committee of coupler manufacturers for a number of years. In his new position he will

H. W. Gilbert

supervise the specialty engineering, specialty development, product testing, road service, and coupler pattern departments. When war restrictions permit, the company plans to expand its product engineering and road service activities. *Harold N. Whitmore,* chief inspector at the company's general office, has been appointed manager of the inspection and test department to succeed Mr. Gilbert. After serving in the Army Air Corps in the last war, Mr. Whitmore joined National Malleable in 1923. He was employed at the company's Cicero, Ill., works from 1928 to 1931. *Archie J. Kashubeck,* of the department of specialty development at Cleveland Ohio, has been appointed sales agent at the San Francisco, Calif., office.

◆

ELECTRONIC LABORATORIES.—*Walter E. Peek,* for the past four years a member of the electric engineering staff of the Electronic Laboratories, Inc., Indianapolis, Ind., has been appointed sales manager.

◆

AIR REDUCTION SALES COMPANY.—*J. M. Driscoll,* manager of the Cleveland, O., industrial sales office of the Air Reduction Sales Company, has been appointed manager of railroad sales, northern division, for the company with offices in Cleveland.

◆

COOPER-BESSEMER CORPORATION.—*A. M. Buxton* has been appointed assistant sales manager of the Cooper-Bessemer Corporation with headquarters at Mt. Vernon, Ohio.

◆

RALPH W. PAYNE.—*W. Conroy Wilson* has been appointed sales and service engineer for Ralph W. Payne, railway appliances and equipment, Washington, D. C.

◆

WHITING CORPORATION. — *Mullaney & Campbell,* Seattle, Wash., has been appointed exclusive sales representative in the Seattle territory for the Whiting Corporation, Harvey, Ill.

J. G. BRILL COMPANY.—*Charles O. Guernsey* has resigned as vice-president of the J. G. Brill Company, Philadelphia, Pa.

◆

PITTSBURGH SCREW & BOLT CORPORATION. —*George E. Horney* has been appointed assistant to the president and elected a director of the Pittsburgh Screw & Bolt Corporation, with headquarters at Pittsburgh, Pa. Mr. Horney formerly was resident vice-president of the company's Gary screw and bolt division. *Gerald J. Garvey,* a member of the sales department of the Gary screw and bolt division, has been appointed general manager of that division, with headquarters in Chicago.

◆

SAMUEL GREENFIELD COMPANY.—*David B. Joseph* has been appointed representative in the southern Ohio district, with headquarters in the Hotel Alms, Cincinnati, O., for the Samuel Greenfield Company of Buffalo, N. Y. Mr. Joseph formerly was vice-president and treasurer of the Edna Brass Manufacturing Company of Cincinnati.

◆

ALLOYS DEVELOPMENT COMPANY.—The Alloys Development Company has announced the licensing of the Carnegie-Illinois Steel Corporation and other subsidiaries of the United States Steel Corporation, the Republic Steel Corporation, and the Lukens Steel Company for the manufacture of "Aldecor," a steel of the "Cor-Ten" type, which resulted from the research of the Alloys Company and was developed by Republic during the past three years. With the recent announcement by Carnegie-Illinois that both Republic and Lukens have taken licenses for the manufacture of "Cor-Ten," the acceptance of licenses for the production of "Aldecor" makes both compositions available from several large producers.

◆

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY.—*P. C. Smith* has been appointed assistant to the manager of the transportation and generator division of the Westinghouse Electric & Manufacturing Company, and *J. S. Askey, G. L. Moses* and *P. G. Lessman* have been appointed section engineers in the department. Since January of last year, Mr. Smith has been assigned to special work in connection with power trains being built by Westinghouse at its New Philadelphia, Ohio, works. *David M. Salsbury,* general manager of the Westinghouse Electric Supply Company, wholesale marketing outlet of the Westinghouse Electric & Manufacturing Co., has been elected vice-president and general manager to head the supply company's operations.

◆

SHELDON MACHINE COMPANY, INC.—The Sheldon Machine Company, Inc., Chicago, builders of Precision Lathes and Arbor Presses, has acquired the Vernon line of machine tools. This line includes the horizontal milling machines, vertical milling machines and jig borers, 12-in. back-geared shapers and universal tool and cutter grinders heretofore built and sold by the Machinery Manufacturing Company of Los Angeles, Calif. All manufacturing of these machine tools has been transferred to the Sheldon plant in Chicago.

CHICAGO RAILWAY EQUIPMENT COMPANY.—*Rowland S. Folk* has been appointed eastern sales manager of the Chicago Railway Equipment Company, with headquarters at New York. Mr. Folk was previously connected with the Valve Pilot Company.

◆

TIMKEN ROLLER BEARING COMPANY, LTD. —This Canadian subsidiary of the Timken Roller Bearing Company of Canton, Ohio, has purchased from the city of St. Thomas, Ontario, approximately seventy-five acres of ground on the east side in Talbot street, as the site of a new bearing and rock bit plant. Design of the plant buildings will be started immediately and operations, requiring an estimated three hundred employees, will begin as soon as possible.

◆

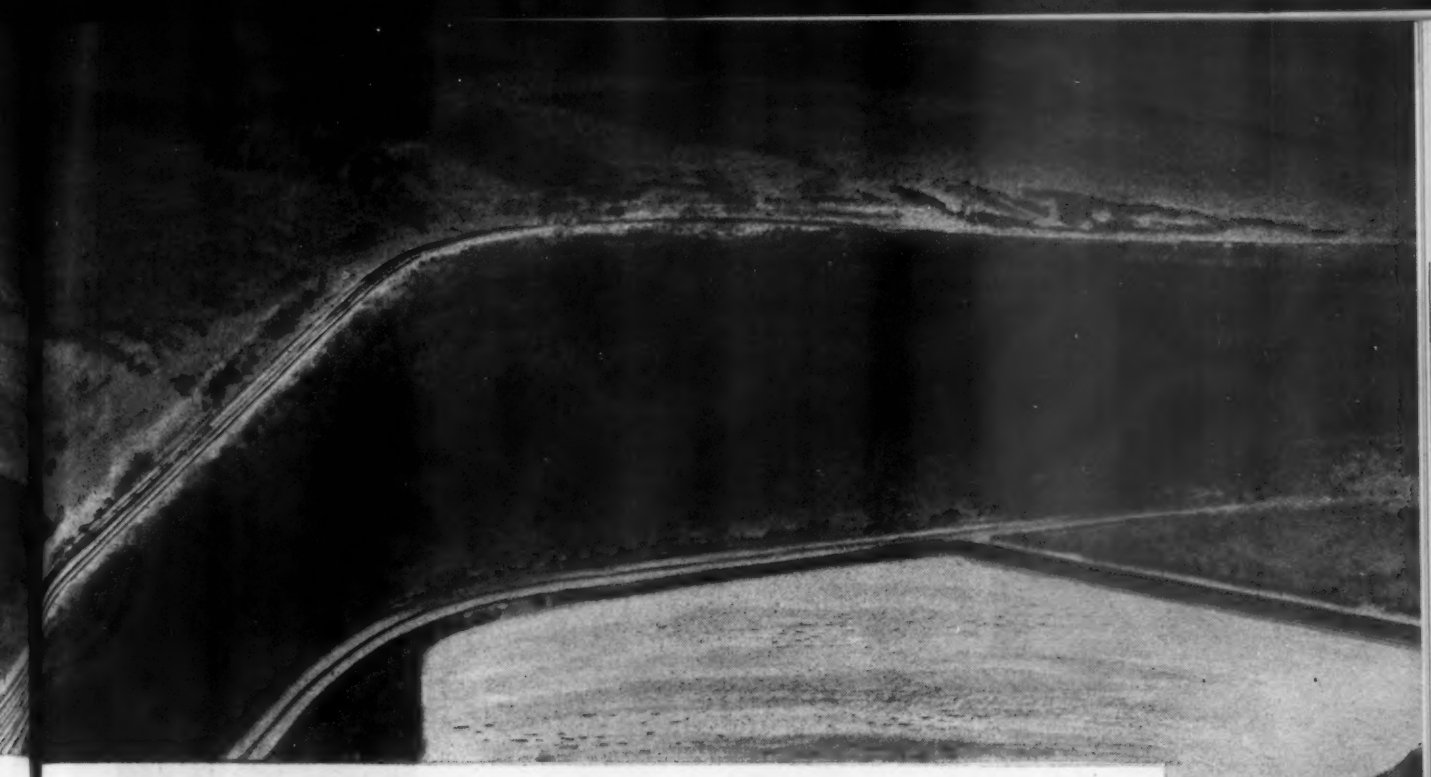
WATERHOUSE & COMPANY.—*David M. Waterhouse,* formerly eastern representative in the railroad field for the Pantasote Company, has organized his own company under the name of Waterhouse & Co., with general offices in Plainfield, N. J., and a sales office at 30 Church street, New York. Mr. Waterhouse plans to open other sales offices when the war ends in Boston, Mass.; Pittsburgh, Pa., and Atlanta, Ga., and to supply the territory extending from Boston to Pittsburgh, and from Buffalo, N. Y., to Florida, with material suitable for the construction and maintenance of passenger-

David M. Waterhouse

train car equipment. The company plans to contact also the transit, bus, marine and airway fields in the same territory. Waterhouse & Co. will represent the following companies in these fields: A. Theo. Abbot & Co., Philadelphia, Pa., "Kapock" Aquapruf-Sunfast fabrics; Blanchard Bro. & Lane, Newark, N. J., leather coverings; Collins & Aikman Corp., New York, pile fabrics for seat coverings; R. L. Hanson, Inc., New York, equipment in steel, aluminum and stainless steel with fabrications by the Watson Manufacturing Company of Jamestown, N. Y.; Micro Molding Corporation, Plainfield, N. J., molded plastic materials for miscellaneous products of special design; Technical Ply-Woods, Chicago, resin bonded plywoods; Union Instrument Corporation, Plainfield, N. J., machine work in steel and brass for miscellaneous products of special design; and the Western Shade Cloth Company, Chicago, vinyl coated and pyroxylin coated artificial leathers.

(Turn to second left-hand page)


Let's get down to earth
on train communication
"UNION"
INDUCTIVE TRAIN COMMUNICATION
I.T.C.
Dependable voice communication
"Union" I.T.C. is the only train communication system designed exclusively for railroad use, by men who know railroad needs, and proved through years of regular railroad service.
New bulletin tells the story
Requisites of a practicable train communication system . . . how "Union" I.T.C. meets all of these requisites . . . what it means in railroad operations . . . how it works . . . installations now in service.
Ask for a copy of Bulletin No. 160.



With this system, train communication naturally follows the right of way

When you have train communication, you want the messages to go where your railroad goes—and nowhere else.

This is another important reason why "*Union*" *I. T. C. is the answer.*

Utilizing tracks and adjacent pole line, coupled by mutual induction, for the transmission of a frequency modulated carrier current, "Union" I. T. C. *naturally* follows the right of way. Curves are no hindrance, and require no special equipment.

Where the pole line leaves the right of way for a long distance, a single wire on stub poles, or even a wire fence near the track can do the job. No physical connection between the pole line and such auxiliaries is needed.

You can reach every point on the railroad with "Union" I. T. C. without interfering with your neighbors.

Full information will be furnished without obligation by our nearest district office.

UNION SWITCH & SIGNAL COMPANY

SWISSVALE PENNSYLVANIA

NEW YORK CHICAGO ARMY NAVY ST. LOUIS SAN FRANCISCO

PITTSBURGH STEEL FOUNDRY COMPANY.—*John M. Mille* has been appointed assistant to the president of the Pittsburgh Steel Foundry Corporation, Glassport, Pa. Mr.

John M. Mille

Mille was formerly manager of the company's Arsenal Machine Shop. Prior to joining Pittsburgh Steel, he had been associated with the Lewis Foundry & Machine Co. as vice-president and works manager, and with the Continental Foundry & Machine Co. as manager of machine shops in East Chicago, Ind., Wheeling, W. Va., and Coraopolis, Pa.

◆

GREENFIELD TAP AND DIE CORPORATION; GEOMETRIC TOOL COMPANY.—The Greenfield Tap and Die Corporation, Greenfield, Mass., has purchased the Geometric Tool Company of New Haven, Conn. It is planned to continue the operation of the Geometric Tool Company as a division of the Greenfield Tap and Die Corporation.

◆

PYRENE DEVELOPMENT CORPORATION.—A new industrial research and development organization, the Pyrene Development Corporation of Newark, N. J., has been formed as a subsidiary of the Pyrene Manufacturing Company, also of Newark. The new organization will carry out research on fire extinguishing equipment and compounds and also work in the field of safety devices and other means for conserving life, health and property. The new officers, drawn from the executives and directors of the parent company, are *Charles G. Durfee*, president; *Edward J. Waring*, vice-president; and *Edward A. Clapp*, secretary and treasurer.

◆

GENERAL STEEL CASTINGS CORPORATION.—*F. B. Barclay, Jr.*, has been appointed assistant to the manager, western district sales, of the General Steel Casting Corporation, at Granite City, Ill. Mr. Barclay attended the University of the South, and joined the General Steel organization in 1930. After serving in the production department of the company's Eddystone, Pa., and Commonwealth plants, he was transferred to the sales department at Granite City in 1935. He was sent to the Chicago district sales office in 1939 and returned to the production department as assistant to the works manager, Commonwealth plant, in 1941.

PHILCO CORPORATION.—*William S. Hogg* has been appointed to the mid-western sales staff of the storage battery division of the Philco Corporation, with headquarters in Cincinnati, Ohio. Mr. Hogg will represent the Philco storage battery division in the Indianapolis, Ind., Louisville, Ky., and Cincinnati, Ohio, area. *R. P. M. Carmody* has been appointed sales representative in the Buffalo, N. Y., area for the storage battery division, with headquarters in the Ellicott Square Building, Buffalo. Mr. Carmody began his career with the Westinghouse Electric & Manufacturing Company, and subsequently was in charge of electrical and mechanical work for the Buffalo Steel Car Company. He formed his own agency to handle electrical and associated equipment in 1936.

◆

AMERICAN LOCOMOTIVE COMPANY.—*R. F. Abell*, mechanical engineer of the Missouri Pacific, has been appointed assistant to the chief mechanical engineer of the American Locomotive Company with headquarters at Schenectady, N. Y. Mr. Abell completed

R. F. Abell

his apprenticeship with the Atchison, Topeka & Santa Fe in 1916 and later was employed for several years with the Missouri, Kansas & Texas. He interrupted his work with this road to join the U. S. Army Engineers Corps in 1917, serving for eleven months in France and for five months in Russia in the Kola peninsula district. He subsequently was employed for a year with the Commonwealth Steel Company, now a division of the General Steel Castings Corporation, before joining the Missouri Pacific in 1925 as general draftsman in locomotive design. He was transferred to the Missouri Pacific's southern properties as assistant mechanical engineer in 1928 and became mechanical engineer of the railroad in 1935.

◆

T-Z RAILWAY EQUIPMENT COMPANY.—*L. R. Gurley* has been appointed, effective January 1, vice-president of the T-Z Railway Equipment Company, with headquarters at 8 South Michigan avenue, Chicago. Mr. Gurley, in addition to engineering and production responsibilities, will be in charge of railway sales in eastern and northeastern United States.

GENERAL AMERICAN TRANSPORTATION CORPORATION.—*William J. Stebler*, vice-president of the General American Transportation Corporation, has been transferred to Chicago as general supervisor of manufacturing for the entire corporation. Mr. Stebler is an alumnus of Duquesne University. He began his business career with the Conley Tank Car Company in Pittsburgh, Pa., in 1924, serving as traffic manager and

William J. Stebler

mechanical superintendent, and was elected vice-president, secretary and director of the Pennsylvania-Conley Tank Car Company in 1931. When the Pennsylvania-Conley Tank Car Company became a division of General American in 1936, Mr. Stebler was appointed general manager of the Pittsburgh district. He was transferred to General American's Sharon, Pa., works in April, 1942, and elected vice-president of the corporation in April, 1943.

◆

SHELDON MACHINE COMPANY.—*Lyman H. Bellows* has been appointed sales manager for the Sheldon Machine Company. Mr. Bellows formerly was with the electric tool division of the Stanley Works.

Obituary

ROLAND G. JUSTUS, manager of industrial sales of the Westinghouse Air Brake Company, died November 30 in Louisville, Ky. He was 53 years of age.

◆

JOHN RAYMOND MAGARVEY, former vice-president of the American Locomotive Company, who retired several years ago, died October 31. He was 88 years of age.

◆

WILLIAM T. HEDLUND, president of the Elastic Stop Nut Corporation, died November 29.

◆

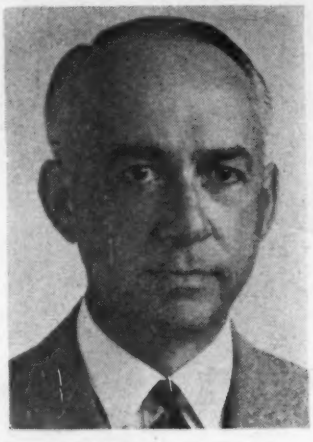
EDWARD M. JOYCE, western sales manager of the Champion Rivet Company, Cleveland, Ohio, died in St. Paul, Minn., on November 14 of a heart ailment while on a business trip. At one time Mr. Joyce was manager of the Cleveland Steel Car Company, and formerly was vice-president of the Illinois Car Manufacturing Company, Hammond, Ind.

Personal Mention

C. L. DICKERT, superintendent of motive power of the Central of Georgia at Savannah, Ga., has retired

J. W. HAWTHORNE, assistant to superintendent of motive power of the Central of Georgia at Savannah, Ga., has been appointed superintendent of motive power, with headquarters at Savannah.

RALPH L. SIMPSON, assistant to the former receiver of the Wisconsin Central (part of the Minneapolis, St. Paul & Sault Ste. Marie) at Minneapolis, Minn., has been appointed general manager of the Soo Line, with headquarters at Minneapolis. Mr. Simpson was born at Stratford, Ont., on Dec. 26, 1892, and entered railway service in March, 1913, as a draftsman in the employ of the Grand Trunk Pacific (now part of the Canadian National) at Transcona, Man. In July, 1917, he went with the Soo



Ralph L. Simpson

Line as chief draftsman at Minneapolis, and in April, 1923, was appointed mechanical engineer. In March, 1937, Mr. Simpson became assistant to the vice-president and general manager; one year later, assistant to the operating officer and in March, 1943, assistant to the receiver.

RUDOLPH L. KLEINE, assistant chief of motive power-car, of the Pennsylvania, who has retired, as announced in the November issue of the *Railway Mechanical Engineer*, was born at Philadelphia, Pa., on December 31, 1874. He attended Drexel Institute and began his railroad career on August 17, 1890, with the Philadelphia, Baltimore & Washington (part of the Pennsylvania). He became foreman on the Central division in December, 1900; general foreman at Washington, D. C., in May, 1901; general car inspector in July, 1902; assistant chief car inspector, lines east, in May, 1906; chief car inspector, lines east, in October, 1906, and assistant chief of motive power-car in 1920. For the past 32 years Mr. Kleine has been directly associated, first, with the development of a standard coupler and, then, with the constant study which has since been devoted to its revision and improvement. He became chairman of the Committee on Couplers and Draft Gear Equipment of the Master Car Builders' Association following the adoption by the association of the coupler standardization project in 1911, and directed it from the outset. Under his direction the committee developed the Type D coupler which was

R. L. Kleine

adopted as standard by letter ballot of the members of the Master Car Builders' Association in 1916 and proposed the Type E coupler, the contours of which were adopted as standard in 1933. He served continuously as chairman of the Coupler and Draft Gear Committee of the Master Car Builders' Association and, after 1919, of the Mechanical Division, until his resignation effective for the present association year. During this extended period of service Mr. Kleine won the respect both of railway men and manufacturers for the fairness with which he handled the relations of the two groups.

DEAN F. WILLEY, general mechanical superintendent of the New York, New Haven & Hartford at New Haven, Conn., has been appointed assistant general manager in charge of engineering, maintenance and mechanical departments, headquarters at New Haven, as announced in the December issue. Mr. Willey was born at Manchester, N. H., on August 5, 1896, and is a graduate of the Massachusetts Institute

Dean F. Willey

of Technology (1920). He entered railroad service with the New York, New Haven & Hartford in June, 1920, as assistant engineer, department of tests. On April 1, 1923, was appointed general material supervisor, October, 1923, mechanical inspector, and in November, 1923, foreman mechanical inspector at Boston, Mass., and in July, 1924, acting general foreman. Mr. Willey became general foreman on November 1, 1924, assistant to superintendent of shops at Readville, Mass., on September 16, 1925, and special mechanical assistant at New Haven on May 16, 1930. He served as mechanical superintendent from January, 1937, to May, 1941, when he was appointed general mechanical superintendent.

H. J. LAVINE has been appointed assistant fuel supervisor of the Minneapolis, St. Paul & Sault Ste Marie, with headquarters at Superior, Wis.

M. W. MCMAHON has been appointed locomotive appliances inspector of the New York Central System with headquarters at New York.

Trade Publications

Copies of trade publications described in the column can be obtained by writing to the manufacturers, preferably on company letterhead, giving title. State the name and number of the bulletin or catalog desired, when it is mentioned.

KRANE KAR.—Silent Hoist Winch & Crane Co., 841-877 Sixty-Third Street, Brooklyn 20, N. Y. Catalog No. 58 descriptive of the Krane Kar mobile swing boom crane for use inside plants and shops, as well as outside in yards and for transferring loads between shops.

◆

BURSTING PRESSURES OF SEAMLESS TUBING.—Globe Steel Tubes Company, Milwaukee 4, Wis. Bulletin 112—a reference chart for engineers with tables of bursting pressures of seamless steel tubing from ⅛ in. to 9⅝ in. outside diameter.

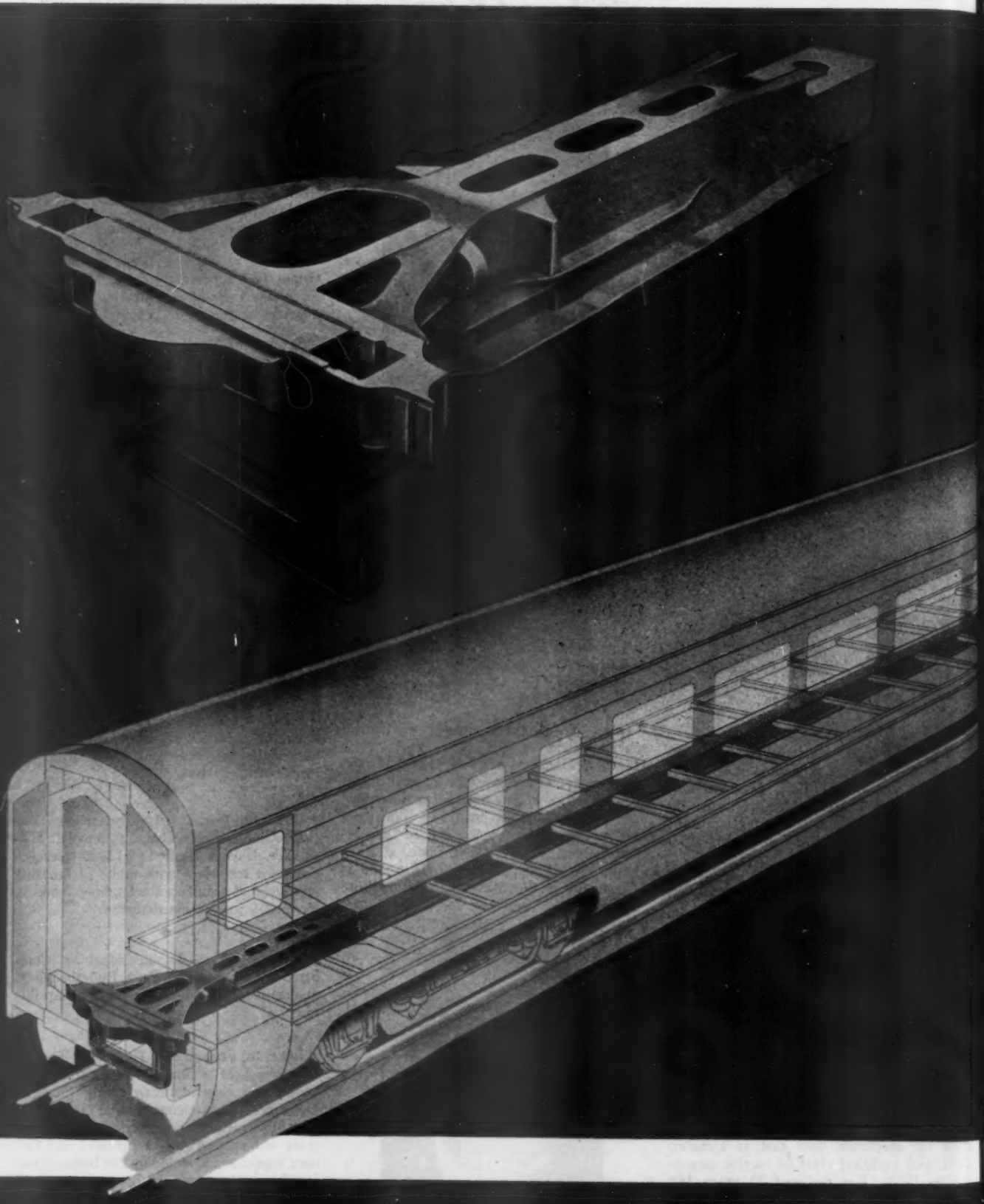
◆

LANDIS TAPS.—Landis Machine Company, Waynesboro, Pa. Bulletin G-94 descriptive of Landis Style ALT collapsible taps.

◆

ELECTRIC FURNACES.—Hevi Duty Electric Company, Milwaukee, Wis., forty-page booklet on electric heat-treating furnaces. Describes heat elements and mountings with illustrations and descriptive data covering numerous types of furnaces and furnace applications, including car bottom type, for various heat-treating operations in railroad maintenance work. References also given to additional bulletins for detail information regarding size, installation and use of particular types.

Your New Passenger



GENERAL STEEL

Cars Will Be Better-Built, Stronger, Safer with COMMONWEALTH One-Piece Platform Center Sill Castings

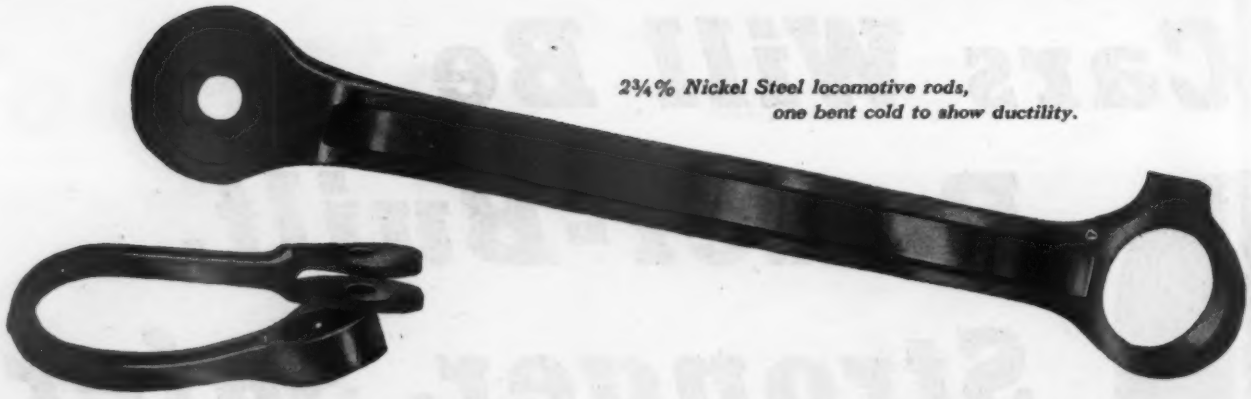
THE introduction of high-speed, modern, light weight passenger trains has necessitated important changes in the construction of passenger cars, both in design and materials, to insure adequate strength with less weight.

The COMMONWEALTH one-piece cast steel Platform Center Sill Casting, incorporated at each end of the car underframe, and connected to the center sill, as illustrated, provides the simplest, strongest, and best construction, minimizing damage to cars in collision. It meets all required safety standards and achieves *great strength without an increase in weight.*

COMMONWEALTH One-Piece Cast Steel Underframe End Castings are also provided with the body bolster cast integral and, if desired, can be arranged for Buffing Device.

COMMONWEALTH CASTINGS

EDDYSTONE, PA.
GRANITE CITY, ILL.



2¾% Nickel Steel locomotive rods, one bent cold to show ductility.

QUENCHED AND TEMPERED

NICKEL STEEL

FORGINGS COMBINE

EXCEPTIONAL DUCTILITY WITH HIGH TENSILE STRENGTH

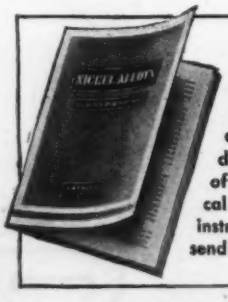
Composition and Typical Properties of Normalized Quenched and Tempered 2¾% Nickel Steel Rods

Description or Size	Melt Yield Pt. No. #s per Sq. In.	Tensile Strength #s per Sq. In.	Elong. % in 2 In.	Reduction in Area %	ANALYSIS					
					Car.	Mang.	Phos.	Sul.	Sil.	Nl
Main Rod....	92900	110000	25.0	64.4	.31	.78	.027	.026	.25	2.75
Main Rod....	86300	104500	25.5	65.6	.32	.86	.034	.032	.29	2.69
Main Rod....	86360	104400	26.0	64.8	.32	.86	.034	.032	.29	2.69
Main Rod....	87850	102350	26.0	66.2	.31	.89	.037	.025	.32	2.69
Front Rod....	86000	102250	25.0	67.3	.29	.82	.035	.027	.24	2.71
Front Rod....	83900	104250	25.0	66.1	.29	.82	.035	.027	.24	2.71
Front Rod....	86850	104250	27.0	66.1	.32	.86	.035	.025	.30	2.65
Front Rod....	89500	107050	25.5	65.6	.32	.86	.035	.025	.30	2.65
Back Rod....	89500	107650	25.0	62.7	.30	.79	.030	.025	.22	2.71
Back Rod....	87500	106450	25.0	65.4	.29	.82	.035	.027	.24	2.71
Back Rod....	87000	105600	25.0	65.4	.29	.82	.035	.027	.24	2.71
Back Rod....	88150	104850	26.0	66.8	.29	.82	.035	.027	.24	2.71

Specimens Taken from Mid-Section of Prolongations of the Forgings

The above table compiled by the American Locomotive Company shows the chemical compositions and mechanical properties of some normalized, quenched and tempered nickel steel front, main and back rods recently produced as replacement rods for locomotives being speeded up and rebalanced. These values are typical of replacement rod forgings recently tested by that company.

Quenched and tempered nickel steel forgings provide high tensile strength and ductility, combined with unusual toughness and high fatigue strength—qualities which tend to obviate breakage and assure long, trouble-free service when employed in heavy duty machinery and equipment.

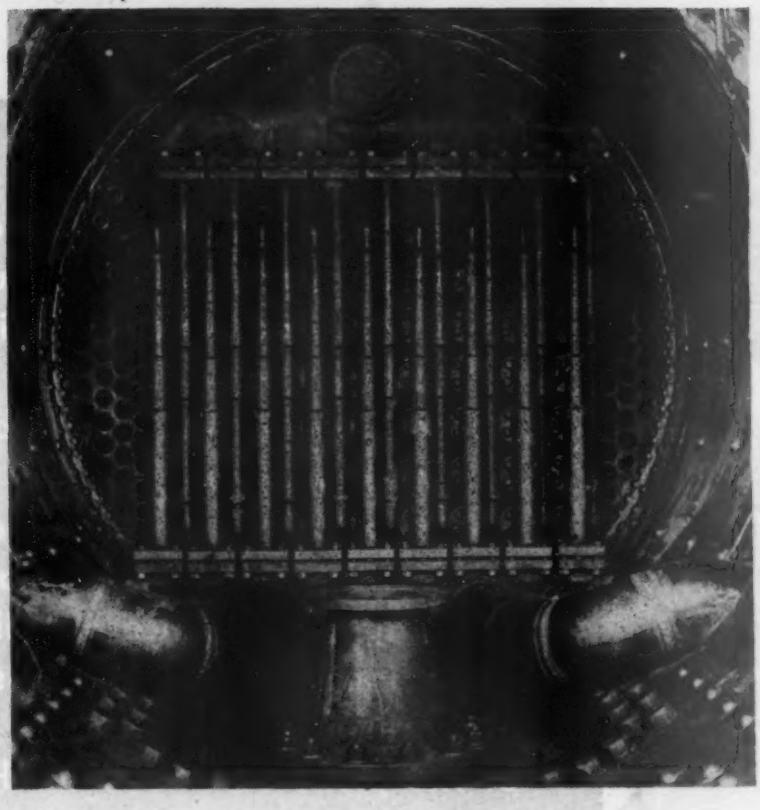


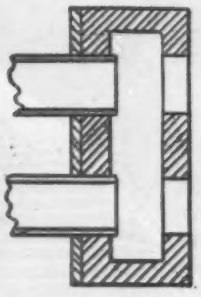
Catalog "C" makes it easy for you to get booklets and bulletins on industrial applications of Nickel, metallurgical data and working instructions. Why not send for your copy today?

* Nickel *

THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall Street, New York 5, N. Y.*

Section through flue





Section through front manifold

THE C-S SUPERHEATER

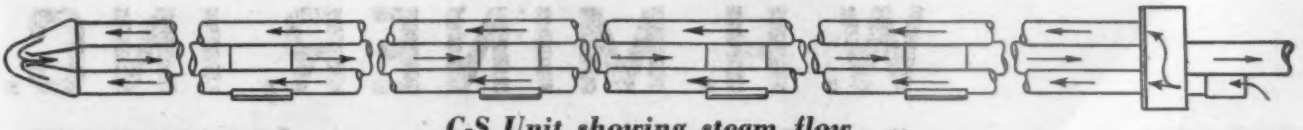
Eight Superior Features

1. **High superheat temperatures consistent with efficient locomotive operation.**
2. **Higher effective boiler pressure due to low pressure drop through equipment.**
3. **System is substantially self-draining.**
4. **The divisional gas flow with minimum restrictions reduces cinder cutting.**
5. **There are no bent pipes.**
6. **It has fewer steam joints in front end due to welded unit connections.**
7. **Superheater inventory is reduced due to greater interchangeability of units.**
8. **Increased availability of engine due to reduced maintenance.**

Send For Descriptive Bulletin.

THE J. S. COFFIN, JR. COMPANY

ENGLEWOOD, NEW JERSEY



C-S Unit showing steam flow


1894
1945
As we enter upon our 51st year in the railway supply field, we express grateful appreciation to our host of railroad patrons for their helpful cooperation, which has always been an inspiration to us in building a service that we feel has played an important part in the development of the American railroads. The amazing performance of rail transportation in this war owes much to the genius and tireless efforts of the pioneers who built the firm foundation of the railroad industry.
We wish to voice our earnest assurance that perfection of service will continue to be our policy in the many years ahead.
W.H.MINER,INC.
CLASS A-22-XB
D- 7935
A.A.R. 1941
PATENTED
W.H.MINER,INC.
CLASS-A-2-XB
D- 7940
A.A.R. 1941
PATENTED

Get this 700 MILLION FEET OF EXPERIENCE . . .

on your pressure-tube problems

No manufacturer can produce enough pressure tubing to reach nearly 5½ times around the earth without acquiring a lot of valuable first-hand information on what it takes to match tubes to jobs for utmost dependability and economy under all kinds of operating conditions. This is just one way of measuring the experience that goes into the making and applying of every B&W Tube for steam generating and heat transfer equipment. It is reflected in their consistently uniform quality and dimensional accuracy and enviable performance service record in all types of equipment.

At B&W you get unbiased technical advice on pressure tubing requirements for B&W can furnish BOTH Seamless and Welded Tubes. In fact, nearly 20,000,000 feet of *welded* pressure tubing alone was supplied by B&W during the past 12 months.

Why not take advantage of B&W's wealth of experience, modern specialty tube mills and extensive research facilities next time you need pressure tubing?

B&W TUBES

ELECTRIC-RESISTANCE WELDED
Carbon steel grades
Sizes: ¾ in. to 4 in. O.D.

SEAMLESS
Complete range of carbon, alloy and stainless steels
Sizes: ½ in. to 8⅝ in. O.D.

THE BABCOCK & WILCOX TUBE COMPANY

WELDED TUBE DIVISION
ALLIANCE, OHIO

SEAMLESS TUBE DIVISION
BEAVER FALLS, PA.

TA-1298

B&W MAKES BOTH

Hennessy

A. A. R. TYPE...

MECHANICAL JOURNAL LUBRICATOR

HENNESSY LUBRICATOR

A.A.R. journals are now subjected to heavier loading, higher speeds and longer continuous runs.

The bearings, bearing materials and lubricant, have been modified to suit wartime conditions.

Because of these changes, to avoid hot boxes, an ample supply of proper lubricant must be delivered to the journal face by mechanical means. This need is met by Hennessy Mechanical A.A.R. Type Journal Lubricators.

No waste is used and waste grabs are eliminated

HENNESSY LUBRICATOR COMPANY, INC.

75 WEST STREET NEW YORK 6, N. Y.

THE DOUGH YOU BLOW —will bring U.S. woe!

What a boom we were handed by World War No. 1! Money came easily —went easily. Everybody was splurging on everything—from silk underwear to diamond sunbursts. Prices went skying. Sugar eventually hit 28¢ a pound!

Bye-bye, boom. Factories closed; men laid off. Prices and wages sinking fast. Wish we'd banked some of that dough we'd blown a few years back! With jobs scarce, that money would have come in mighty handy, then.

Prosperity. Stocks up fifty points in a week. Again everybody was buying everything—yachts, jewelry, stocks, real estate, regardless of cost. Depression? Phooey . . . we thought we'd found a way to lick depression.

Or had we? Bread lines, apple venders. WPA. "Brother, can you spare a dime?" No jobs. Prices dropping. Wages dropping. Everything dropping—except the mortgage on the house. "What goes up must come down."

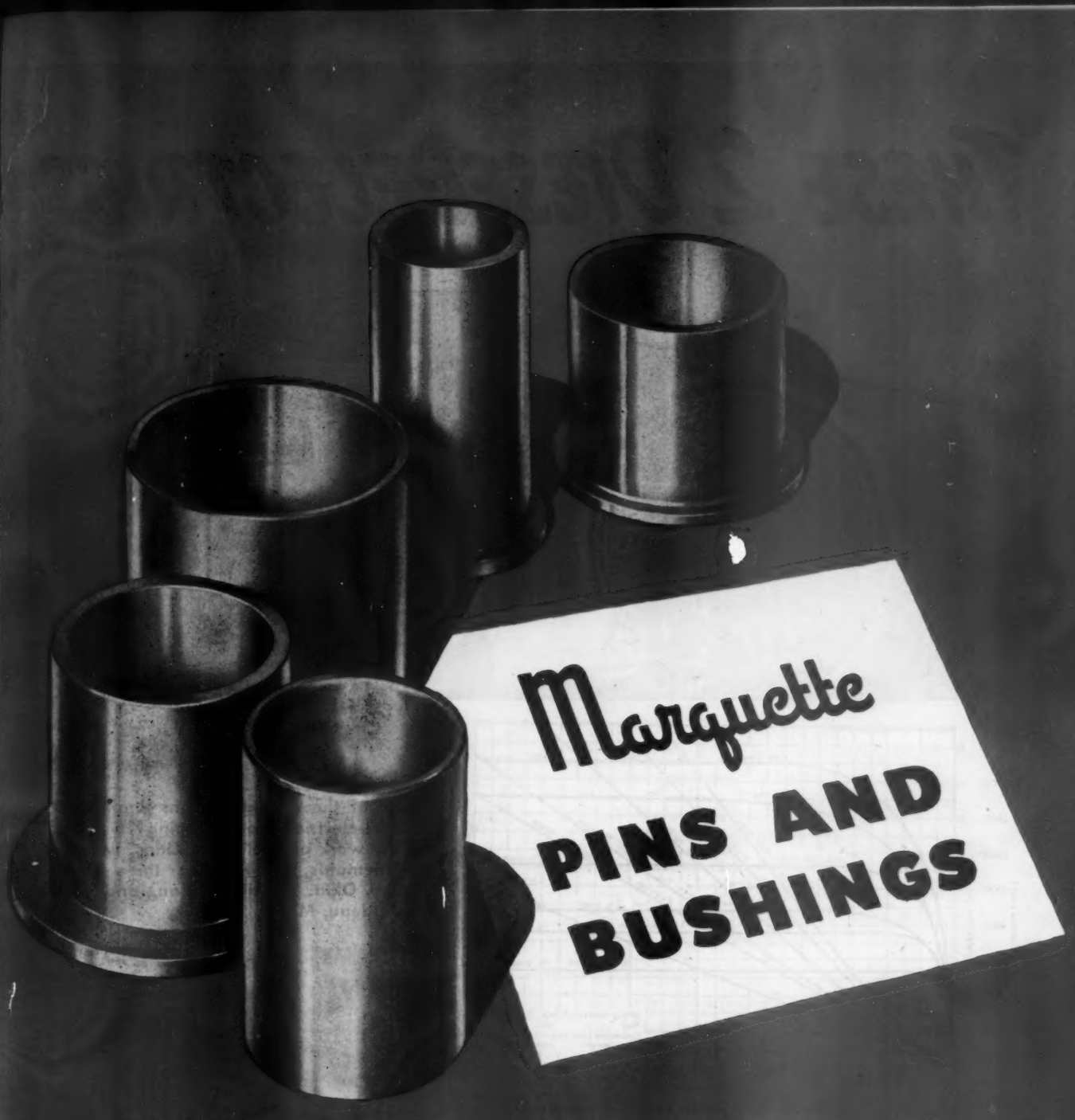
We're splurging again. Americans have been earning more money. But even today there are fewer goods to spend it on—so naturally prices rise. We must keep them in check. DON'T LET *IT* ALL HAPPEN AGAIN!

---

4 THINGS TO DO to keep prices down and help avoid another depression

1. Buy only what you really need.
2. When you buy, pay no more than the ceiling prices. Pay your ration points in full.
3. Keep your *own* prices down. Don't take advantage of war conditions to ask for more—for your labor, your services, or the goods you sell.
4. *Save.* Buy and hold all the War Bonds you can afford—to help pay for the war and insure your future. Keep up your insurance.

A United States War message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by this magazine in co-operation with the Magazine Publishers of America.



Marquette PINS AND BUSHINGS

★ NITRALLOY AND HARDENED STEEL

BUY MORE WAR BONDS
ARMY E NAVY
FOR EXCELLENCE

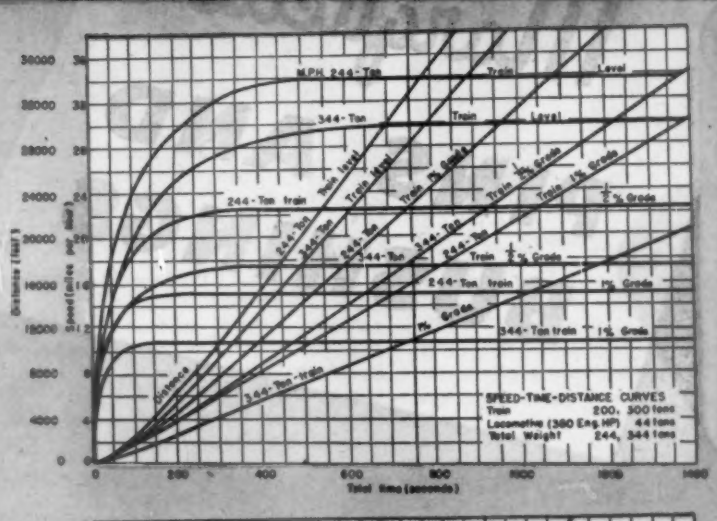
The Marquette METAL PRODUCTS CO.

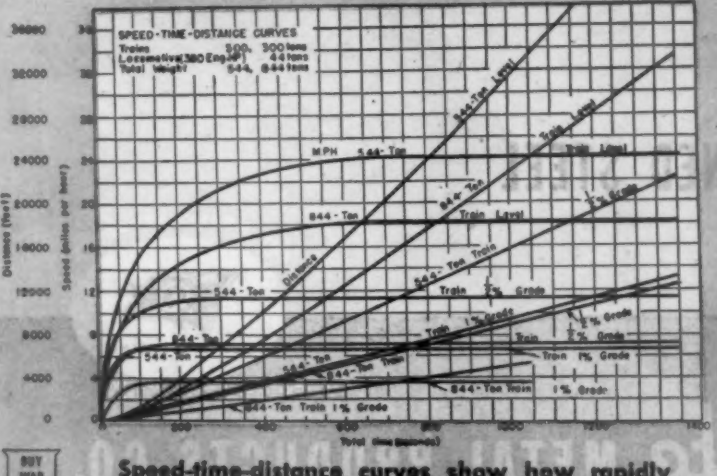
CLEVELAND 10, OHIO

Manufacturers of: HYDRAULIC AND ELECTRIC WINDSHIELD WIPERS FOR AIRCRAFT
HYDRAULIC GOVERNORS FOR DIESEL ENGINES • ROLLER BEARING TEXTILE SPINDLES • FUEL OIL PUMPS
AIR COMPRESSORS • PRECISION PARTS AND ASSEMBLIES

"These 2 Diesel-electrics

Five of these "Lightweight Champion" diesel-electrics are averaging 16 hours' daily work on the Frisco Lines; two are in Memphis, and the other three are at Hugo, Okla., Neodesha, Kan., and Cape Girardeau, Mo.





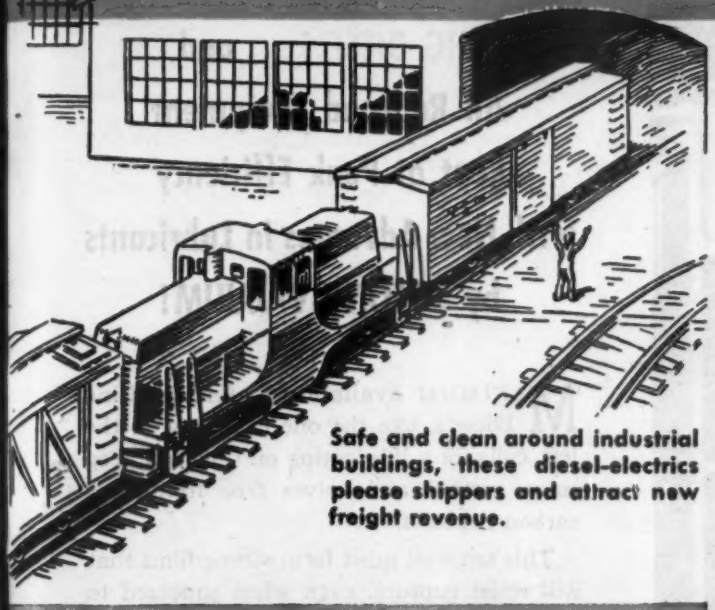
Speed-time-distance curves show how rapidly the 44-tonner will accelerate various loads under different grade conditions.

Packing plants, running day and night, depend on prompt delivery of live stock. The Frisco depends on its diesel-electrics for the handling of this valuable freight.

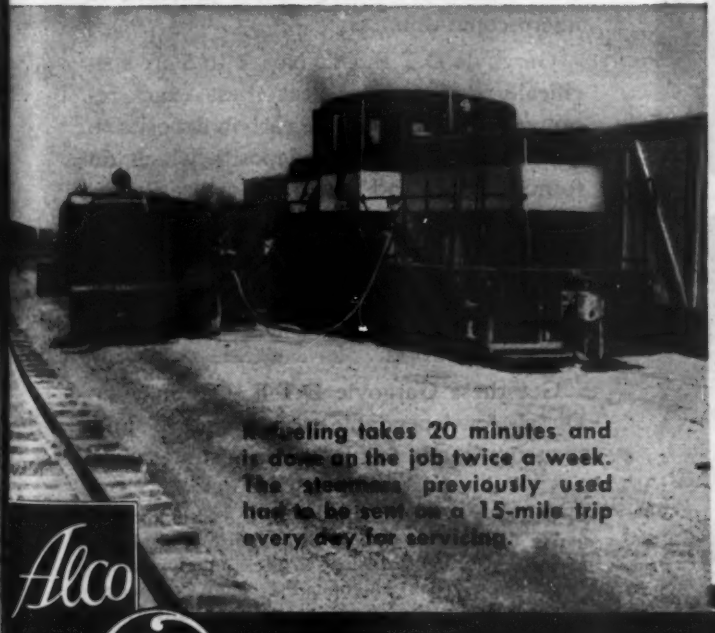
RELEASED 4 STEAMERS—

—licked a tough grade, and brought us new revenue"

H. L. Werman, *Vice President in charge of operations*
St. Louis-San Francisco Railway



Safe and clean around industrial buildings, these diesel-electrics please shippers and attract new freight revenue.



Refueling takes 20 minutes and is done on the job twice a week. The steamers previously used had to be sent on a 15-mile trip every day for servicing.

TO furnish war-booming Memphis industries with 40 hours' switching a day—at the exact time each plant called for it—the Frisco Lines had to keep four heavy steam locomotives at work. Now, it's done by two of these versatile 380-hp diesel-electrics—at 30 per-cent lower cost per locomotive-hour, and in places where previously the steamers were not admitted.

A manufacturer of plane parts who banned steamers from his entire plant property as a safety measure has turned over all the plant's freight handling to the Frisco because the diesel-electrics can safely go right inside the long shipping building to pick up the loaded cars.

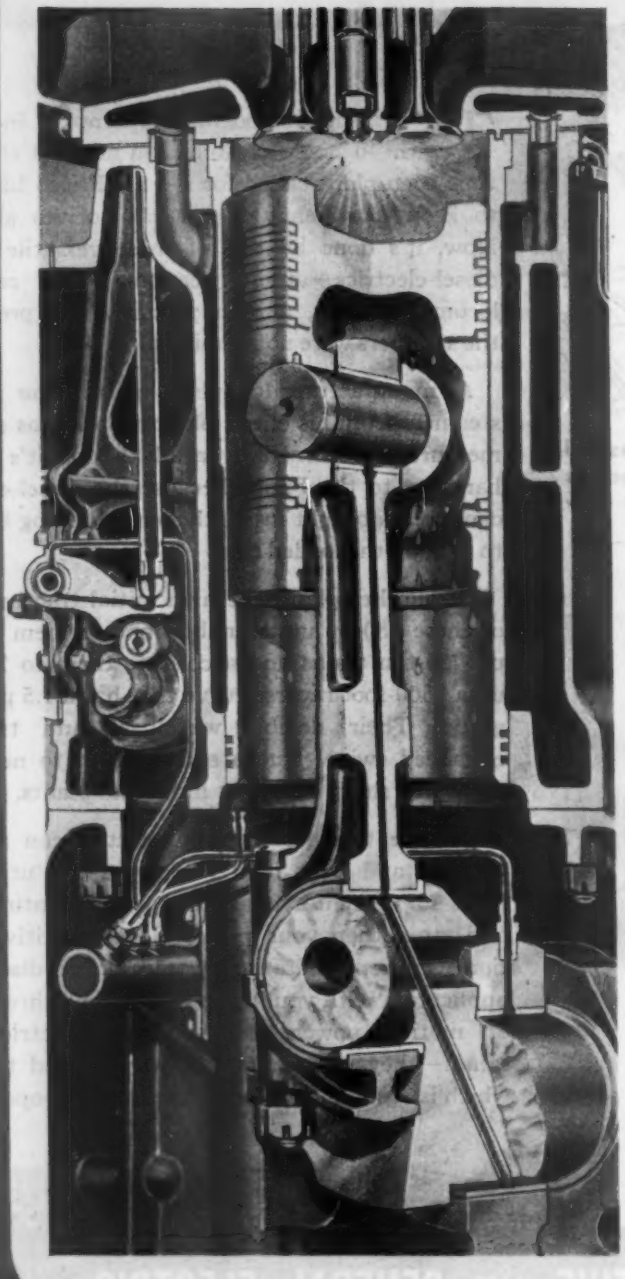
At another plant, the high initial tractive effort of these 380-hp units enables one of them to pick up 255-ton trains and accelerate them to 7:5 mph up a 1500-foot reverse curve that has a 1.5 per-cent grade. Their flexible wheelbase and two-axle equalized swivel trucks enable them to negotiate easily the sharp curves at industrial plants.

Because this 44-ton diesel-electric can also do transfer and light road work, you can utilize all of its 95 per-cent availability to cut operating costs and strengthen your peacetime competitive position. Our representatives would like to discuss its application with you. Since we build all three types of motive power—diesel-electric, electric, and steam—they can impartially recommend the one which is economically best suited to your operation.

Alco GE

AMERICAN LOCOMOTIVE AND GENERAL ELECTRIC

FULL POWER AHEAD ON EVERY TRACK!



BIG DIESELS . . . and All Railroad Equipment kept at Peak Efficiency with New Advances in Lubricants by SOCONY-VACUUM!

MAXIMUM availability of Main Line Diesels, like the one cut-away at the left, calls for a lubricating oil that will keep rings, pistons and valves *free* from hard carbon deposits.

This same oil must form strong films that will resist rupture, even when squeezed to microscopic thinness.

Gargoyle D.T.E. Oils Nos. 1 to 5 are specifically designed to meet these exact requirements. They reduce carbon deposits to a minimum and those deposits which do form, are soft and fluffy and are easily removed.

These same famous oils also are setting high performance records in large stationary Diesels and are preferred by ship operators all over the world.

Get these Gargoyle D.T.E. Oils in your Diesels for dependable performance . . . and to assure "ready-to-run" engines at all times.

SOCONY-VACUUM OIL CO., INC. • Standard Oil of N. Y. Division • White Star Division • Lubrite Division • Chicago Division • White Eagle Division • Wadhams Division • Magnolia Petroleum Company • General Petroleum Corporation of California.

STEAM LOCOMOTIVES. For air pumps, special oils are available that protect vital parts from wear, reduce ring and valve-clogging deposits to a minimum. On driving journals, Socony-Vacuum's special driving journal grease gives dependable performance. There's a Gargoyle product for every steam locomotive need.

MAINTENANCE OF WAY. Working closely with makers of maintenance-of-way equipment, Socony-Vacuum has developed specific recommendations for all tools and their motors.

SHOP LUBRICATION. For every shop machine you operate Socony-Vacuum offers not only latest lubrication developments, but scientific application to assure highest efficiency at least cost.

GARGOYLE

Railroad Lubricants

IT PAYS TO KNOW WHAT'S NEW IN LUBRICATION

SOCONY-VACUUM

OIL COMPANY, INC.

IF YOU CHECK YOUR RECORDS REGARDING INSULATION THIS IS WHAT YOU WILL PROBABLY FIND

SAVE MORE FUEL WITH INSUTAPE PIPE INSULATION

Sixty-four per cent of bare pipe heat losses can be eliminated by the application of Insutape! These savings have been proven by tests conducted under *still air* conditions. Savings are much greater under wind velocity conditions encountered in actual operation of rolling stock! When coupled with the fact that Insutape can be used over and over again, it is easy to understand why Insutape is a standard of quality and economy on a majority of the nation's railroads.

UNION ASBESTOS

MEANS PROGRESS IN INSULATION

AND RUBBER CO.

TWO WAYS TO SAVE MONEY

and increase passenger comfort too

IN "ACTIVE SERVICE" FOR TWELVE UNINTERRUPTED YEARS! WOVENSTONE PIPE INSULATION

Many mechanical and operating men report that their rolling stock still is equipped with its original Wovenstone train line steam pipe insulation—equipment that was placed in service as long as twelve years ago! Wovenstone remains firm and snug against the pipe; is unaffected by the constant beating of road ballast on its surface; will not loosen, sag or shake down. It can be removed and reapplied over and over again without loss of original efficiency. That's why Wovenstone is a standard of quality and economy on a majority of the nation's railroads.

310 S. MICHIGAN AVENUE
CHICAGO 4, ILLINOIS

800,000 Miles "Without delays"!

IN three years of grueling wartime service, Seaboard Air Line's big Diesel Locomotive "3016" has rolled up the proud record of 800,000 miles "without delays."

Over that period "3016" has flashed hundreds of times between Florida and points North hauling the famous "Silver Meteor" and other fine Seaboard trains.

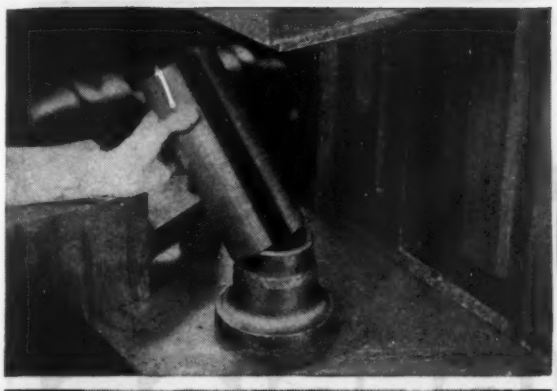
"Without delays" means notable maintenance efficiency . . . and adequate lubrication. Seaboard uses SINCLAIR GASCON GL-CC Diesel Oil for lubrication of "Number 3016" and other passenger, freight and switcher Diesels.

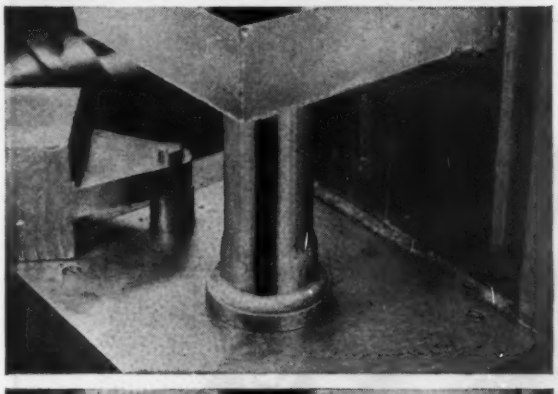
Sinclair Gascon gives cool engine operation with absence of deposits that cause ring sticking and carbon troubles. Its wear-prevention qualities hold down time-out for overhauls and maintenance costs.

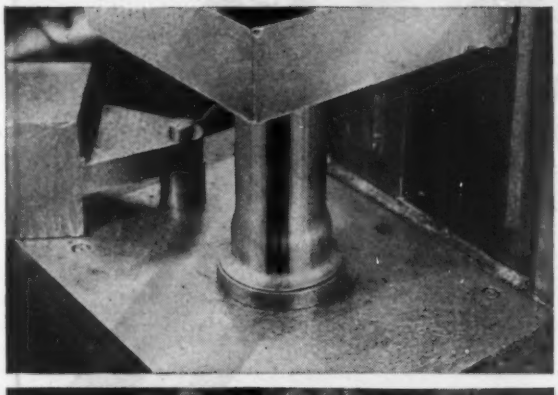
May our Engineers tell you more about the advantages of using Sinclair Lubrication?

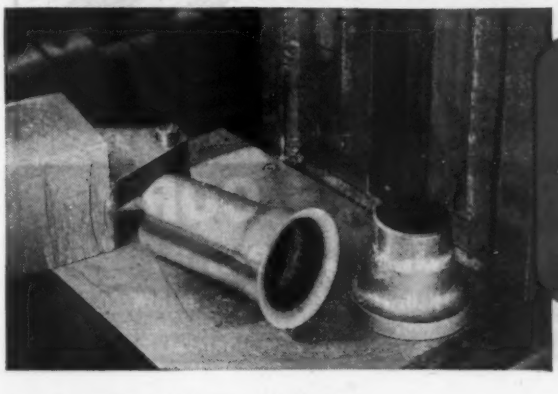
SINCLAIR RAILROAD LUBRICANTS

SINCLAIR REFINING COMPANY, *RAILWAY SALES*, NEW YORK • CHICAGO • SAINT LOUIS • HOUSTON









HOW

ONE SIMPLE TEST

CAN STOP PRODUCTION OF AN ENTIRE BOILER TUBE LINE

THE ELECTRUNITE process of tube manufacture is practically foolproof. But even so, every coil of flat-rolled steel, every lot of tubing and, finally, ***every tube*** must pass the rigid testing routine established and maintained to protect users of Republic ELECTRUNITE Boiler, Condenser and Heat Exchanger Tubes.

These five photographs illustrate the steps in one test applied to samples taken from every coil of steel as it is welded into tubing.

The samples are expanded over a plug which opens the tube until its diameter is increased ¼" beyond its original diameter—a test considerably more severe than the ordinary roller expanding operation.

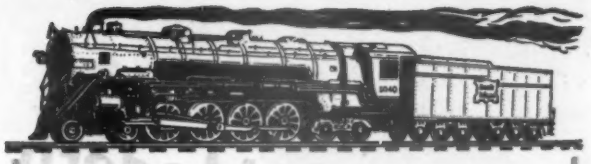
The expanded end is then flared over at right angles until the flange is 30% greater than the original diameter of the tube.

If a sample should fail during this or any of the many other ELECTRUNITE tests, production on this line is stopped immediately and not resumed until the condition causing the difficulty is remedied.

Would you like to know more about these tubes and their records of safety and economy in all types of steam generating and heat transfer equipment? Write us.

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION · CLEVELAND 8, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic
ELECTRUNITE
Reg. U. S. Pat. Off.
BOILER, CONDENSER AND HEAT EXCHANGER TUBES

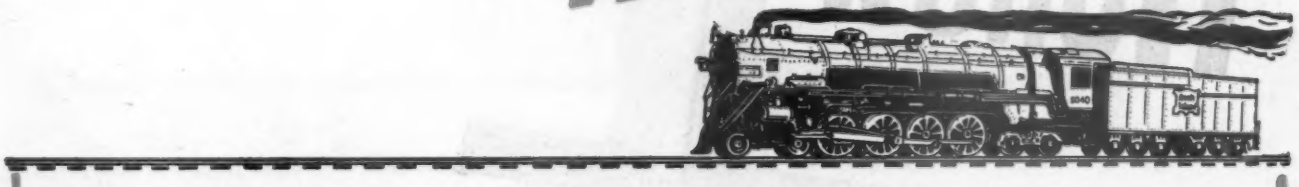


AVERAGE MILEAGE PER MONTH, 3800

ADD

TIMKEN BEARINGS

RESULT



AVERAGE MILEAGE PER MONTH, 8700

WITH REPAIR COST REDUCED 6½ CENTS PER MILE

The above has been the experience of The Rock Island Lines with their "5000 Class" locomotives, heaviest and most powerful on the road. There are 65 of these engines in service, the first of which were purchased in 1929.

Since being changed over to Timken Roller Bearings, they have shown an average monthly mileage *increase* of 4,900 miles, and now are averaging approximately 100,000 miles per year. Maintenance cost meanwhile has declined sharply.

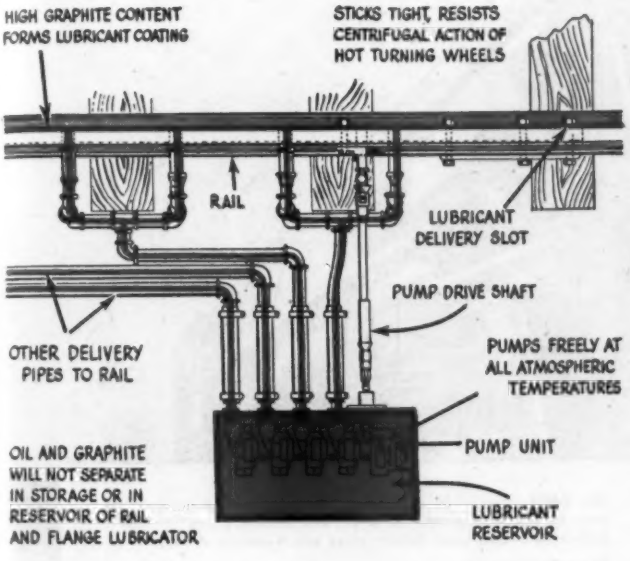
This information is reprinted from the April, 1944 issue of Rock Island Lines News Digest, which also contains the following statement: "The remarkable performance of these and other Rock Island steam locomotives in freight service is indicated by the fact that while total gross ton miles in 1943 were almost 33½ billion compared to a little over 19½ billion in 1939, an increase of approximately 70 per cent, the load was moved by about the same number of engines." The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

RAILWAY ROLLER BEARINGS

High-melting-point flange lubricant clings to hot wheels and rails



Calol Rail and Flange Lubricant will reduce excessive wear from the sheering action and terrific pressures between wheel flanges and rails on curves. This specialized lubricant contains a high percentage of a special type of graphite together with a heat-resistant oil that holds the graphite on flanges and the sides of rails. This heavy protective coating withstands the tremendous pressures developed by trains traveling at high speed on curves.

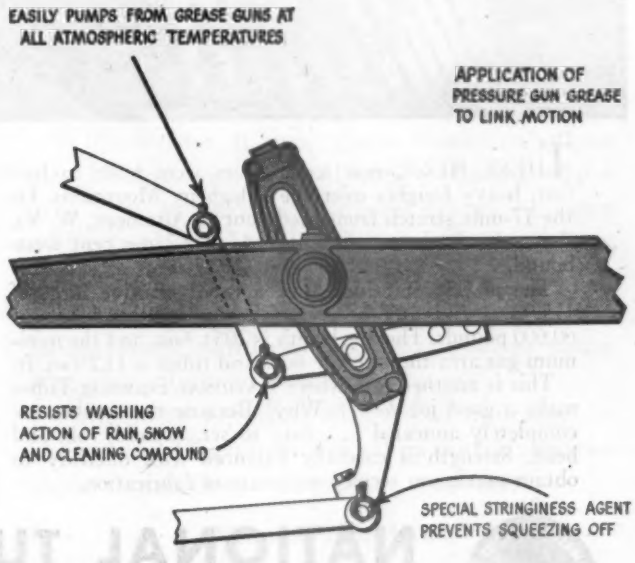
Because of its high affinity for metal, Calol Rail and Flange Lubricant resists the centrifugal action of hot, fast-turning wheels, thus reducing lubricant loss.

Calol Rail and Flange Lubricant has good pumpability at all atmospheric temperatures, and its consistency prevents air-locking, assuring positive delivery in all types of automatic applicators.

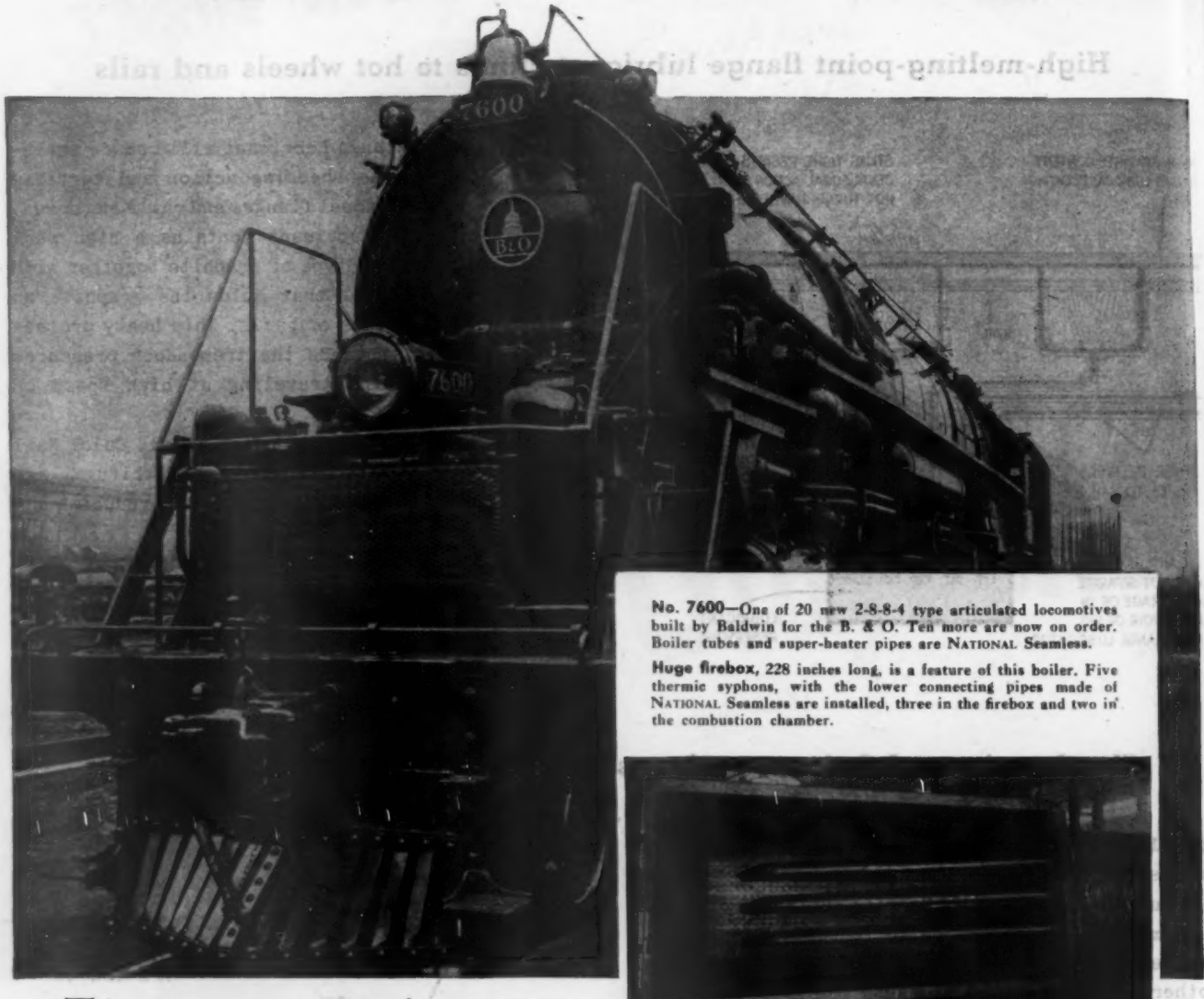
Shock-resistant lubricant prolongs life of soft-grease lubricated parts

Calol Pressure Gun Grease is made especially to withstand continuous hammering shocks without squeezing or rubbing off bearing surfaces, and will add many miles of service to locomotive bearings, valve motion parts, shoes, wedges, hub liners and other parts requiring pressure gun grease.

A special stringiness agent, added to the heavy-bodied oil and water-resistant-type soap from which Calol Pressure Gun Grease is made, provides its great shock resistance and allows surplus grease to feed slowly from the reservoir to bearing surfaces. The water-resistant nature of Calol Pressure Gun Grease prevents washing away or any change in its characteristics when in contact with rain, ice and snow on a run, or cleaning solutions in the yards. It pumps freely in all atmospheric temperatures. There are two grades of Calol Pressure Gun Grease. Winter, actually an all-year lubricant. Summer, a special grade for unusually severe service.



20 new B&O "GOLIATHS" built with strong innards of National Seamless



No. 7600—One of 20 new 2-8-8-4 type articulated locomotives built by Baldwin for the B. & O. Ten more are now on order. Boiler tubes and super-heater pipes are NATIONAL Seamless.

Huge firebox, 228 inches long, is a feature of this boiler. Five thermic syphons, with the lower connecting pipes made of NATIONAL Seamless are installed, three in the firebox and two in the combustion chamber.

THESE HUGE new locomotives were built to haul fast, heavy freights over the Allegheny Mountains. On the 17-mile stretch from Piedmont to Altamont, W. Va. they negotiate a maximum grade of 2.2 per cent westbound.

The new locomotives have a rated tractive force of 115,000 pounds and the average driving axle load of about 60,600 pounds. The flue length is 20 ft. 6 in. and the minimum gas area through the flues and tubes is 11.20 sq. ft.

This is another case where NATIONAL Seamless Tubes make a good job *better*. Why? Because these tubes are completely annealed . . . easy to set, expand, roll, and bead. Strength is carefully balanced with ductility to obtain maximum service with ease of fabrication.

NATIONAL Seamless Tubes are pierced from solid billets of steel (Walls Without Welds)—no longitudinal weld—no long line of potential weakness. They are made from completely killed, i.e., thoroughly deoxidized steel and therefore have better creep properties at high temperatures, while the uniform density, freedom from laminations, and sound metal structure of deoxidized steel provide superior heat transfer characteristics. Where cinder cutting is severe, NATIONAL heavy-ended tubes have proved to be the answer.

Bulletin is available on request.

WALLS WITHOUT WELDS

NATIONAL TUBE COMPANY

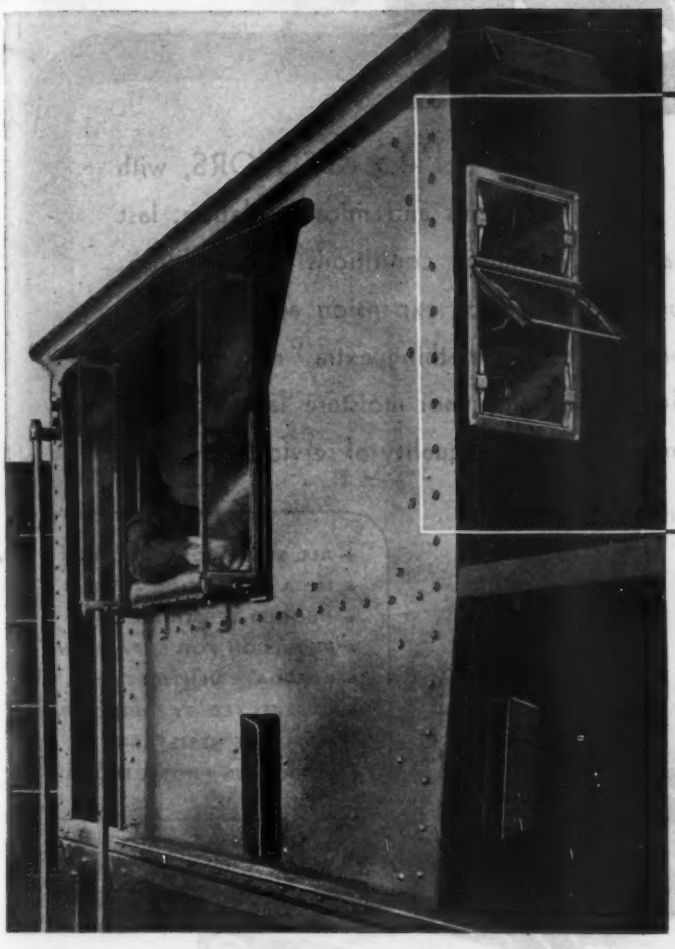
Pittsburgh, Pa.

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

NATIONAL TUBE COMPANY · USS · STEEL · UNITED STATES STEEL

UNITED STATES STEEL

PRIME



Clear Vision WINDOW PANEL

with or without defrosting device and washer

● Permanently mounted, or installed in the front door of cab, the Prime Clear Vision Window Panel gives engineer two to four inches more forward vision than do other clear vision type windows mounted in the same space.

Prime window opener device, integral with frame, permits exact adjustment of opening to suit crew. Closes weather-tight—no seepage.

With Prime spring glass retainers, glass may be removed or replaced without tools—in a few seconds. No more delays enroute while broken glass is replaced. Spring glass retainers also relieve operating strains on glass; eliminate vibration. Shatter-proof glass. In standard windows each pane takes same size glass. Less store stock.

Panels are supplied with or without cast-in Defrosting Device and Washer which assures clear vision even in severest weather.

Write for Literature

...in any size and shape to fit the cab!

PRIME'S PLUGS

PRIME essential equipment for steam, diesel and electric locomotives

Milwaukee 4, Wis.

BUILT TO LAST LONGER

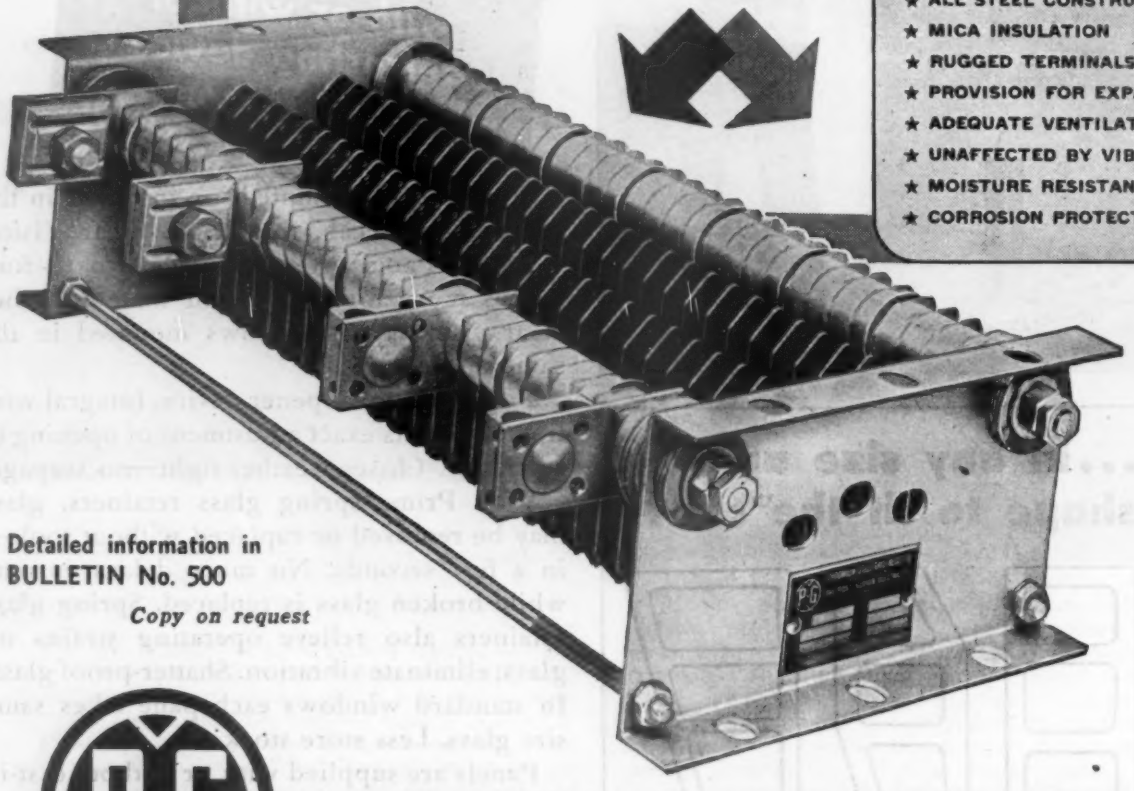
where conditions may be

Destructive or Hazardous

P-G RESISTORS, with their non-corrosive steel resistor elements and mica insulation, last longer under extremely adverse operating conditions. In addition, P-G exclusive floating bolt provision for expansion and allowance for adequate ventilation provide that "something extra" needed for a truly rugged resistor. Neither vibration, nor moisture laden or corrosive atmospheres have material affect on quality of service.

Try P-G Resistors for your toughest job.

- ★ ALL STEEL CONSTRUCTION
- ★ MICA INSULATION
- ★ RUGGED TERMINALS
- ★ PROVISION FOR EXPANSION
- ★ ADEQUATE VENTILATION
- ★ UNAFFECTED BY VIBRATION
- ★ MOISTURE RESISTANT
- ★ CORROSION PROTECTED



Detailed information in BULLETIN No. 500

Copy on request

P-G

The Nonbreakable Steel Grid Resistor

THE POST-GLOVER ELECTRIC COMPANY

• ESTABLISHED 1892 •

221 WEST THIRD STREET, CINCINNATI, OHIO

For light weight

Without sacrifice of strength —No other material can *Equal*

ALLOY STEELS

• In the years just ahead, light weight will become more and more important as a specification of railroad equipment — because light weight means greater efficiency and economy in operation.

Republic Alloy Steels will help you achieve light weight—*without sacrifice of strength.*

These fine steels are exceptionally high in strength-to-weight ratio. They can be used safely in smaller sections. They are unsurpassed in hardenability—resist wear. They are tough and strong—withstand shock and severe strains. They have the endurance to resist fatigue. They perform safely at "red" heat or in sub-zero cold. And they resist corrosion.

All in all—Republic Alloy Steels will do the rough and tough jobs —the important jobs—efficiently *and at low cost.*

Republic — world's largest producer of alloy steels—is ready to have an experienced metallurgist discuss your needs and tell you which analysis to use for best results in each application.

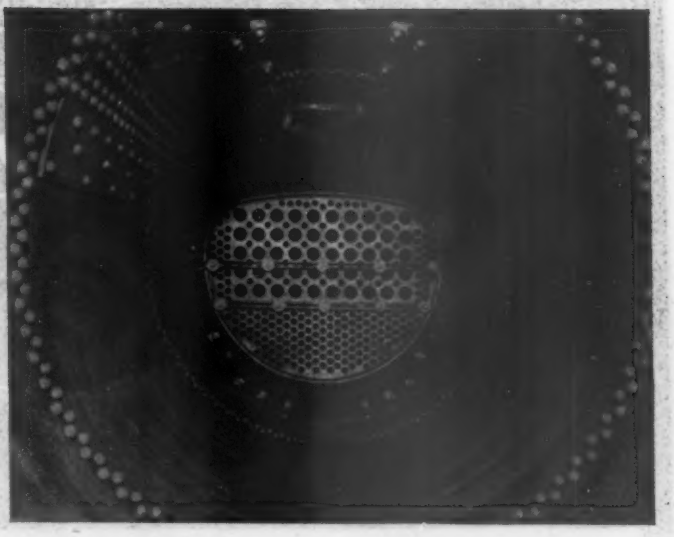
REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Bldg., New York 17, N. Y.

Republic
ALLOY STEELS

Also Carbon and Stainless Steels—Sheets—

APEXIORIZED BOILERS

Save Men...Time...Materials



On a number of railroads, APEXIORIZED metal has lowered average maintenance costs, lightened and made more effective boiler washing, and prolonged the life of flue and sheet steel under boiler water. Under today's manpower conditions, such great lightening of maintenance work as it permits can hardly be stressed enough.

APEXIOR NUMBER 1 is a non-insulating brush-applied surfacing material for the water side of locomotive boiler flues, shells, firebox sheets, and stay bolts. The coating of APEXIOR protects against corrosion without loss of heat transfer by filling and covering the surface of the metal to an average thickness of 0.0025 inch. Water contact with the metal and penetration of the metal structure is prevented.

CLEANING MADE EASIER—MORE EFFECTIVE

The character of an APEXIORIZED surface is such that dirt and scale do not bond as tightly as to the bare steel. Thus boiler washing is made more effective . . . fewer man-hours and fewer cleanings are required.

HOW APEXIOR WORKS

APEXIOR NUMBER 1 is not a substitute for feedwater preparation or chemical treatment. It supplements the work of the chemist and water service engineer by increasing the durability and raising the service quality of boiler metal under boiler water and steam temperatures and pressures.

Long operation of APEXIORIZED heating surfaces at all pressures and ratings and in all types of boiler equipment has indicated that APEXIOR does not retard heat transmission.

One half of this piece of standard locomotive flue has been surfaced with APEXIOR NUMBER 1. It illustrates how APEXIOR has saved many badly-pitted flues from going to the scrap pile. The entire tube was passed through a sandblasting machine before the application. Acid cleaning will give equally good results.

APEXIOR NUMBER 3

This tough, durable coating protects the interior of general tank or tender equipment. Brush-applied cold, it air-dries to a chemically inert, dense, shiny black film. APEXIOR NUMBER 3 protects against water or moisture below 125 degrees F. It resists acid or alkali solutions. Used also on locomotive shell exteriors underneath the lagging where dry heat conditions are below 450 degrees F. It resists corrosive gases or fumes.

APEXIORIZED surfaces are helping to solve the motive power and manpower problem today. They require less attention . . . less man-hours . . . and they last longer because APEXIOR takes the wear. Make your own test now. Send for additional details today.

APEXIOR

A Peacetime Plus ★ ★ ★ A Wartime Must

RECOMMENDED BY ALL U. S. AND CANADIAN BOILER INSURANCE COMPANIES

The **DAMPNEY COMPANY**
of America
protective coatings for
STATIONARY BOILERS, LOCOMOTIVES AND STEAMSHIPS

THE DAMPNEY COMPANY OF AMERICA
Hyde Park, Boston 36, Mass.

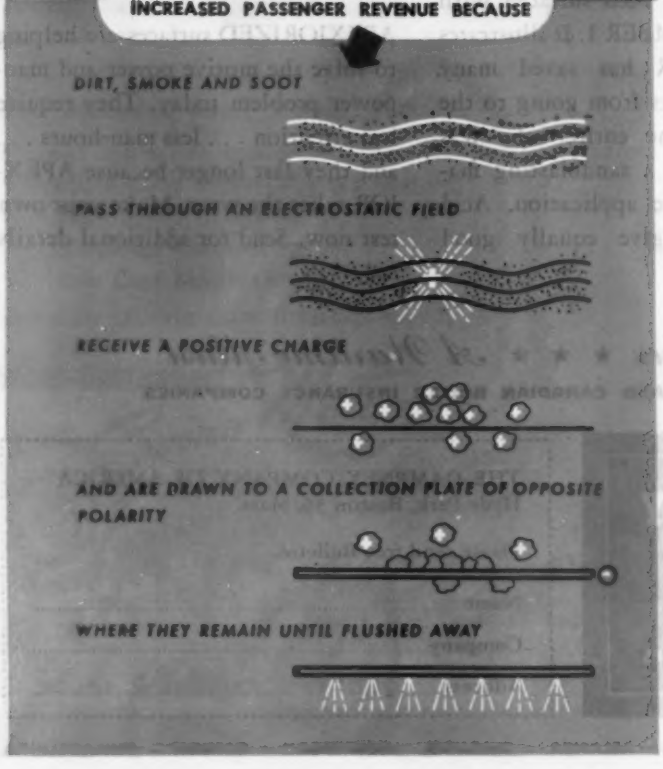
Please send free Bulletin.

Name.....

Company.....

Address.....

Main Office: **HYDE PARK • BOSTON 36, MASS.** • Branch Offices: **ATLANTA • CHICAGO • NEW YORK • DETROIT • PHILADELPHIA**



Strenuous competition in transportation means postwar passengers must be handled with care . . . delivered swiftly, safely *and without an accumulated coating of smoke, dust and cinders.*

This can be done easily by electronically-cleaning air in passenger cars with Precipitron*. This new principle is so efficient it removes more than 90% of the dirt, smoke and grime in the air, even particles as small as 1/250,000 of an inch. Precipitron can be installed readily in the air conditioning system of any car, and it is designed particularly for easy and infrequent cleaning.

Precipitron offers an extra benefit in the postwar scramble for passengers . . . complete freedom from travel dirt. Your nearest Westinghouse office will be glad to send you a new book, B-3420, with complete information on Precipitron for passenger cars. Or write Westinghouse Electric & Manufacturing Company, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-90545

*Trade mark registered in U.S.A.

Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

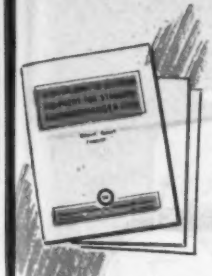
Precipitron

THE ELECTRONIC AIR CLEANER

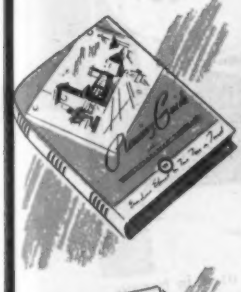
Train Talk

NEWS AND VIEWS ON ELECTRICAL EQUIPMENT
FOR TRAIN, TRACK AND TERMINAL

The Burlington Railroad Streamliner, General Pershing, traveling between St. Louis and Kansas City in April 1939, was the first passenger train to be equipped throughout with fluorescent lighting. With the advent of the modern streamlined train, quality of lighting was greatly improved . . . attractive fixtures eliminate glare and increased electric power supply automatically increases luminous intensity.



Fluorescent lighting, water coolers, air cleaning and power supply are reviewed in a recent prospectus featuring "Development of Electrical Equipment for Standard Railroad Passenger Cars". Separate specifications are also available for the convenience of railroad executives, designers, engineers and car builders, in planning the passenger car of tomorrow—today.



Postwar railroad travel will be greatly stimulated by modernization of station facilities. Feeder traffic will be more quickly handled, parking facilities more convenient, waiting rooms will be more attractive and comfortable. If you are contemplating redesign or expansion of station, terminal, repair shop, warehouse or office, you will want a copy of the "Planning Guide" (B-3350).

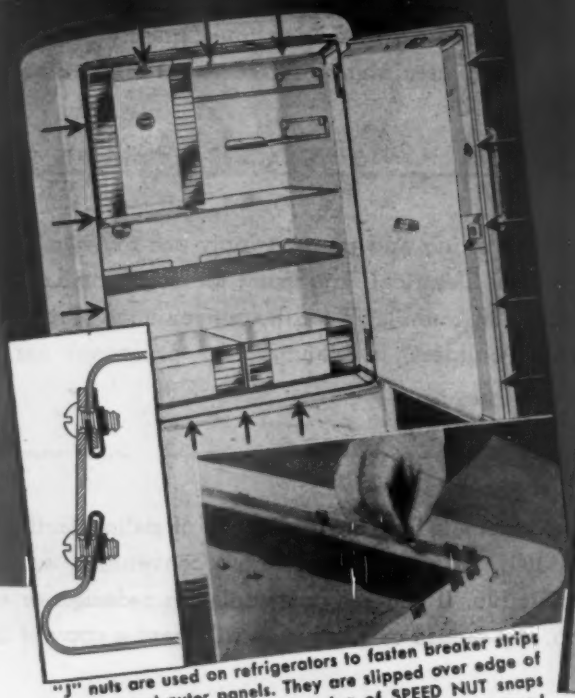
Improve the quality of welding and the efficiency of the welder through education. "Causes and Cures of 14 Common Welding Problems" is the title of a 24-page pocket-size booklet (B-3326) and a popular wall chart (DC-250). Good tips on safety are fully explained in "Safety in Gas and Electric Welding" (B-3458). All three are yours for the asking.

Designers and engineers interested in postwar building and conversion are invited to make full use of Westinghouse Transportation Engineering facilities and service . . to keep abreast of the latest improvements and developments of electrical equipment. For more information or descriptive product literature, call your nearest Westinghouse office. Or write to Westinghouse Electric & Manufacturing Co., P. O. Box 868 Pittsburgh 30, Pa.

Westinghouse ELECTRICAL EQUIPMENT FOR TRAIN, TRACK, TERMINAL

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

THE "J" Type SPEED NUT ALSO *Improves* ASSEMBLY OF PEACETIME PRODUCTS



"J" nuts are used on refrigerators to fasten breaker strips to inner and outer panels. They are slipped over edge of flanges and extrusion in lower leg of SPEED NUT snaps into register with screw holes. They eliminate tapped strips and permit a perfect seal by preventing a gap between assembled parts.

In electric range assembly, "J" type SPEED NUTS are used in heavy-duty applications. Here the one-piece top and splasher is fastened firmly to end panels with a resiliency that absorbs stress caused by expansion, thus preventing enamel damage.

WIDELY used prior to the war and now being used extensively on war materials, "J" nuts will be in still greater demand for peacetime production. For "J" nuts are a faster and more economical means for blind location fastening. Quickly *snapped by hand* into screw-receiving position, they do away with expensive welding, riveting, and staking. Their spring tension lock assures a positive fastening that *eliminates vibration loosening*—and has sufficient resiliency to prevent damage to enamel, plastic or glass.

"J" type SPEED NUTS can be designed into your products . . . let us show you how they will simplify and speed up your assembly *and* reduce costs. Send us your assembly details and we'll gladly rush samples.

TINNERMAN PRODUCTS, INC.
2029 FULTON ROAD, CLEVELAND 13, OHIO
In Canada: Wallace Barnes Co., Ltd., Hamilton, Ontario
In England: Simmonds Aerocessories, Ltd., London

Speed Nuts
PATENTED *Trade Mark Reg. U. S. Pat. Off.

FASTEST THING IN FASTENINGS

THE BASIC PRINCIPLE
of Spring-Tension Lock is
Embodied in all Speed Nut Designs

Famous GRIPS

The Half-Nelson **GRIP** and Crotch Hold. It was with this combination that Frank Lewis won the World's Championship at the Olympic Games in 1936.

- The **Half-Nelson** as applied by the Champion couldn't be broken until he released his **GRIP**.
- **GRIP** Nuts, too, are famous for their unmatched ability to **GRIP** and hold, under the most severe conditions of vibration.
- Their **GRIP** can be broken only by a man with a wrench.

GRIP *Nuts do not lose their* **GRIP** *in emergencies*

Or at any other time!

Many Lock Nuts — only one **GRIP** *Nut*

GRIP NUT COMPANY

310 SOUTH MICHIGAN AVENUE, CHICAGO 4, ILLINOIS

Serving American Railroads since 1906 REGIONAL OFFICES: ST. PAUL · MINNEAPOLIS · ST. LOUIS
SAN FRANCISCO · CHICAGO · CLEVELAND · SALT LAKE CITY · SALISBURY, N. C. · PITTSBURGH · NEW YORK

EXIDE POWER DIESEL POWER

TEAMMATES

. . . for the "long pull"

BACK in the days when Diesel engines first commanded attention, Exide engineers began the development of a battery specially designed for Diesel cranking. As Diesels grew in size and power, Exide development kept pace. And when the great Diesel locomotives began roaring over the rails there were powerful Exide Batteries ready to take on the cranking job.

Today, on many of America's busiest railroads, Exide Batteries are performing a multitude of tasks—cranking Diesels, powering the signal and train telephone systems, lighting and air-conditioning passenger cars, etc. And wherever Exides are used, they are performing dependably, with long-life and ease of maintenance. When you buy an Exide, you *Buy* to *Last*.

ARMY E NAVY

Exide BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32

Exide Batteries of Canada, Limited, Toronto

that's

the Houdaille record

● More than ten years ago Houdaille* engineers developed the *first* hydraulic equipment to insure the superb riding comfort and stability of the world's *first* lightweight high-speed train.

Today Houdaille Double-Acting Shock Absorbers are giving highly efficient service on the most famous streamlined trains in America — service which in many cases has exceeded the million mile mark.

Improved Houdaille railroad instruments for vertical, lateral and journal box control are now ready for post-war production. Ask us about them.

HOUDE ENGINEERING DIVISION OF

HOUDAILLE-HERSHEY CORPORATION

MAKERS OF HYDRAULIC CONTROLS

Buffalo 11, New York

*Pronounced—Hoo-dye

Use Nature's Abundant Elements

FOR ECONOMICAL, SAFE PASSENGER CAR AIR-CONDITIONING

The SAFETY *System* STEAM EJECTOR EQUIPMENT

Operates with Air and Water

WATER in the form of steam from the locomotive operates the ejector compressor. **WATER** cools the condenser. **AIR** cools the condenser. **WATER** operates the purge ejector to remove air and gases from the condenser. **AIR** transfers heat from the car to the cooling coil in the air conditioning unit. **WATER** absorbs this heat from the cooling coil and transfers it to the refrigerating unit. **WATER** is evaporated to produce the cooling effect. **AIR** is free — **WATER** costs little. No costly refrigerants used.

THE SAFETY CAR HEATING and LIGHTING COMPANY, INC.
NEW YORK - CHICAGO - SAN FRANCISCO - PHILADELPHIA - BOSTON - ST. LOUIS - MONTREAL

ARMY E NAVY

Do you have these GOULD Catalogs?

There's a Gould catalog for every major storage battery application. Each is designed to help storage battery users. Write for copies today; they're yours for the asking.

For excellence in storage battery production at Depew plant

GOULD

SINCE 1898 . . . THE BATTERY PICKED BY ENGINEERS

Dept. 61 GOULD STORAGE BATTERY CORPORATION
Depew, New York

Send me the following Catalogs:

- ☐ 100—Industrial Truck Batteries
- ☐ 200—Mine Locomotive Batteries
- ☐ 300—Shuttle Car Batteries
- ☐ 400—Aircraft Instruction Manual
- ☐ 700—Diesel Locomotive Batteries
- ☐ 800—Railroad Carlighting and Air-Conditioning Batteries
- ☐ 900—Railroad Signal Batteries
- ☐ 1000—Stationary Batteries

Name_____ Title_____

Firm_____

Street_____ City and State_____

Factories: Atlanta • Chicago • Dallas • Depew • Leavenworth • Los Angeles North Bergen • Rock Island • Saint Paul • Sioux City • Zanesville

"Our windows at home aren't this clear, Mother!"

It's easy to see why. The "breather" feature of Adlake Double-Glazed Windows permits air between the two panes of glass to adjust itself quickly to changes in temperature, altitude, humidity. The two panes, hermetically sealed, assure visibility at all times unaffected by fog or frost.

The only maintenance required is routine washing and replacement of panes broken in service . . . there is no dehydrating compound, no devices at all to service.

Adlake Double-Glazed Windows are again furnished in aluminum and can be aluminated if desired. They are designed and produced for new cars or reconditioning present equipment, and to standards that have won their reputation for superiority throughout years of service. Write for prices and details . . . and specify Adlake.

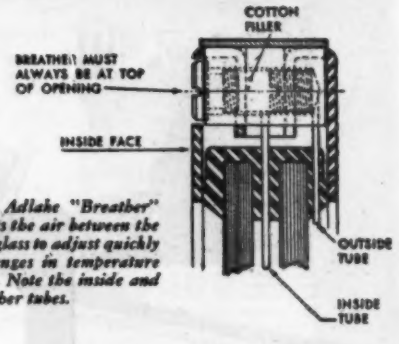
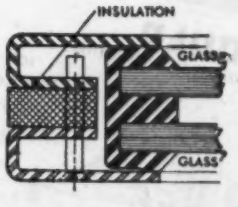


Diagram of Adlake "Breather" which permits the air between the two panes of glass to adjust quickly to rapid changes in temperature and altitude. Note the inside and outside breather tubes.



Both frames of the Adlake sash are insulated from each other. This prevents cold from traveling to the inside face of the unit and eliminates frosting.

Adlake TRADE MARK

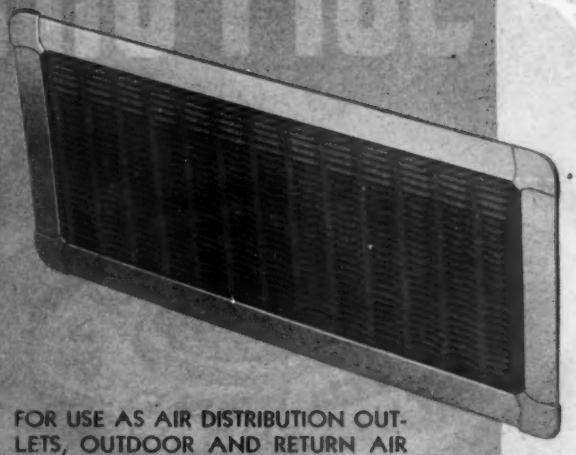
THE ADAMS & WESTLAKE COMPANY

ESTABLISHED IN 1857 — ELKHART, INDIANA — NEW YORK · CHICAGO

ADLAKE RAILWAY CAR EQUIPMENT, FITTINGS and SPECIALTIES • DOUBLE-GLAZED ALUMINUM WINDOWS • WINDOW CURTAINS • VESTIBULE CURTAINS • SECTIONAL DIAPHRAGMS • LUGGAGE RACKS • ASH RECEPTACLES • HARDWARE

BARBER-COLMAN

PRODUCTS FOR RAILWAY SERVICE



FOR USE AS AIR DISTRIBUTION OUTLETS, OUTDOOR AND RETURN AIR REGISTERS AND TRANSFER GRILLES FOR COMPARTMENT DOORS.

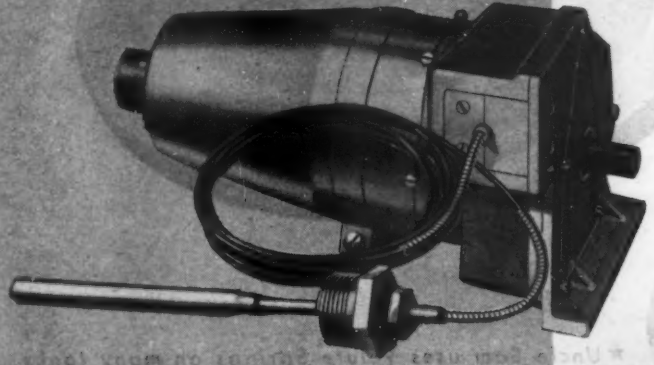
uni-flo
GRILLES *and* REGISTERS

UNI-FLO Grilles and Multi-louver Registers are ideal for railway service. They are fabricated of *sheet steel.* The core construction is *rigid.* The fin strips are folded and have pressed-in support bars to give a firm interlocking assembly. Registers have a series of one inch wide overlapping blades to *provide tight shut-off.*

FOR OVERHEAD AIR DISTRIBUTION IN PASSENGER CAR SPACES, SMOKING ROOMS, AND PASSAGEWAYS.

venturi-flo
CEILING OUTLETS

VENTURI-FLO Ceiling Outlets are fabricated of *spun steel* members, and have been designed for center duct air distribution systems. They have flow characteristics similar to those of the well-known fluid flow measuring device, the Venturi meter. When desired, provision can be made for quick removal of the unit for cleaning the supply duct.



FOR PROPORTIONING CONTROL OF DIESEL ENGINE OIL AND COOLING WATER TEMPERATURES.

SELF-CONTAINED
POWER UNITS

Self-Contained Power Units have been designed for automatic control of oil and cooling water temperatures. These accurate and dependable units maintain temperature by positioning the cooler shutters. They give true proportioning operation without overrun or "hunting".

BARBER-COLMAN COMPANY
ROCKFORD • ILLINOIS

"Shock-Group" SUPPORT

STYLE A-6-A
HOLLAND
VOLUTE
SNUBBER SPRINGS

Release ONE A. A. R. Coil Truck Spring out of EACH Nest!

Overloaded Spring Groups are the "Shock Troops" of railroading. Let Holland Volute Springs absorb and cushion today's greatly-multiplied spring shocks.

★ *Uncle Sam uses Volute Springs on many tanks*

SIGNAL CORPS PHOTO

HOLLAND COMPANY 332 SO. MICHIGAN AVE., CHICAGO

POST-WAR POWER INSURANCE...

An alkaline battery in the battery compartment saves weight where it counts most — near the middle of the car. The larger the kilowatt-hour capacity, the greater is the weight that can be saved by using an alkaline battery.

Edison

THE LIGHT WEIGHT BATTERY
FOR LIGHT WEIGHT CARS

IT MAKES no difference which electrical system you may decide to use in new post-war passenger cars—32-volt, 64-volt or 110-volt—you can be certain that Edison Alkaline Batteries will provide standby power of unequaled dependability. They operate equally satisfactorily with any of these systems. Installations of 25-cell, 50-cell and 88-cell batteries have been used successfully with all three for many years.

In fact, alkaline batteries have proved so dependable that, after delivering normal service life on passenger cars, they are often reapplied to baggage, express or other cars having smaller load demands. There they give additional years of unfailing service. Thus, you have full assurance that alkaline batteries will provide the power insurance necessary for utmost passenger comfort and convenience on your post-war cars. ***Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, New Jersey.***

Though it gets freight there FAST_ *Ride-Control's* BUILT TO LAST!

NO SPRING PLATES

NO SPRING PLANKS

THE A. S. F. Ride-Control Truck (A-3) is an easy-riding freight-car truck. And, when employing the long-travel coil springs that permit faster operation, such increases in speed entail no penalty of increased maintenance. For the Ride-Control prevents the development of destructive harmonic oscillation. All bolster motion, both vertically and laterally, is cushioned and controlled by Ride-Control spring pressure . . . the flexible connection that provides smooth, day-in-day-out operation.

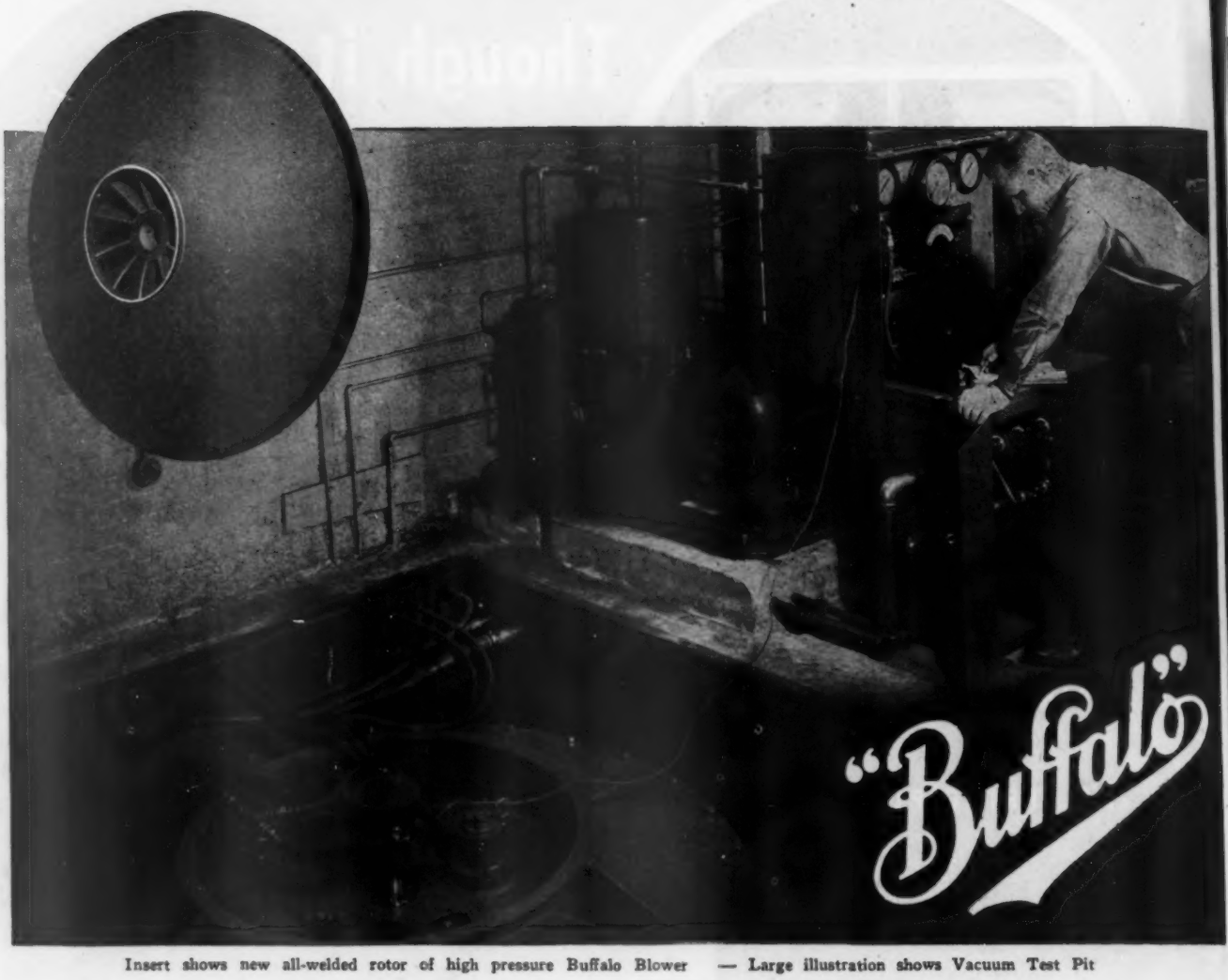
Rugged and simple in construction, without spring plates or spring planks, this truck is designed to keep more cars moving, more of the time.

AMERICAN STEEL FOUNDRIES

CHICAGO

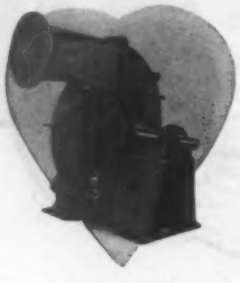
MINT-MARK OF FINE CAST STEEL

THE TRUCK FOR TODAY'S NEED . . . TOMORROW'S SPEED!



Insert shows new all-welded rotor of high pressure Buffalo Blower — Large illustration shows Vacuum Test Pit

Test Pit Makes New Hi-Efficiency, Hi-Speed, All-Welded Wheels Possible



"The fan is the heart of the system"

"Fan Engineering" — the air Engineers Handbook — 740 pages of useful data. Price $4.00 Postpaid in U. S. A.

For many years, fan manufacturers have been limited by the unknown speeds at which fan rotors will fail. Because high speed fans are not ordinarily sold in quantity, cost of testing single rotors has been prohibitive. For example, to test a 36 inch rotor at 2,000 rpm requires 50 hp., at, say, 4,000 rpm, the horsepower mounts to 400. Step this speed up to 8,000 rpm and 3,200 hp is required. Larger wheels, of course, run proportionately higher.

Because of this, fan manufacturers have in the past wisely kept speeds well below the theoretical limits, so that wheel failures have been infrequent. Sometimes maximum efficiency has been sacrificed because of this fact.

"Buffalo" engineers, dissatisfied with this method of design, built the vacuum test pit where rotors are tested to destruction in an almost perfect vacuum. Because there is no air resistance, rotors may be operated at speeds up to 60,000 rpm. In the pit, horsepower requirements, exclusive of bearing friction, are only 1/4000th of that required in the atmosphere.

As a result of experiments "in the pit" Buffalo now offers new high pressure blowers and higher pressure centrifugal compressors. These have newly designed rotors some of which are all-welded. Efficiencies are high—maintenance costs are nil, and the user can be sure of fine performance on the job.

Your requirements may never call for high pressure fans, but when you buy even a disk fan, it's nice to know that the manufacturer is leading the field in the search for better products.

"Buffalo" engineering sales representatives located in all principal cities will be glad to give you full information about Buffalo fans and air conditioning equipment—call them.

"Buffalo" "First For Fans"

BUFFALO FORGE COMPANY

174 Mortimer Street Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Buy WAR BONDS

America's FIRST Aluminum Boxcar

Built by GREAT NORTHERN . . . of ALCOA Aluminum

FACTS ABOUT GREAT NORTHERN'S ALCOA ALUMINUM BOXCAR

Inside Dimensions: 40 feet 6 inches long; 9 feet 2 inches wide; 10 feet high.

Weight: 43,500 pounds.

Nominal Capacity: 50 tons.

Load Limit: 125,500 pounds.

Amount of Aluminum used: 3,722 pounds.

Savings in Weight by using Aluminum: 4,057 pounds.

Specialties: "Dreadnought" ends, "Murphy" roof, "Youngstown" doors, "Open Grip" running board, "Union Metal" floor protector plates, threshold plates, "Open Grip" brake step, and door post protectors—all made of Alcoa Aluminum. Specialties made by Standard Railway Equipment Manufacturing Company, Youngstown Steel Door Company and Morton Manufacturing Company.

Trucks: American Steel Foundry's A-3 trucks with Ride Control and Timken roller bearings.

Frame: Steel.

Out of the shops of the Great Northern Railway at St. Cloud, Minnesota, has rolled America's first aluminum boxcar!

And it's made with Alcoa Aluminum!

Outside sheathing, roof, corrugated ends, doors, floor-protective doorway plates, corner posts, running boards and brake step—all are made of high-strength Alcoa Aluminum. Aluminum alloy rivets were used in assembling.

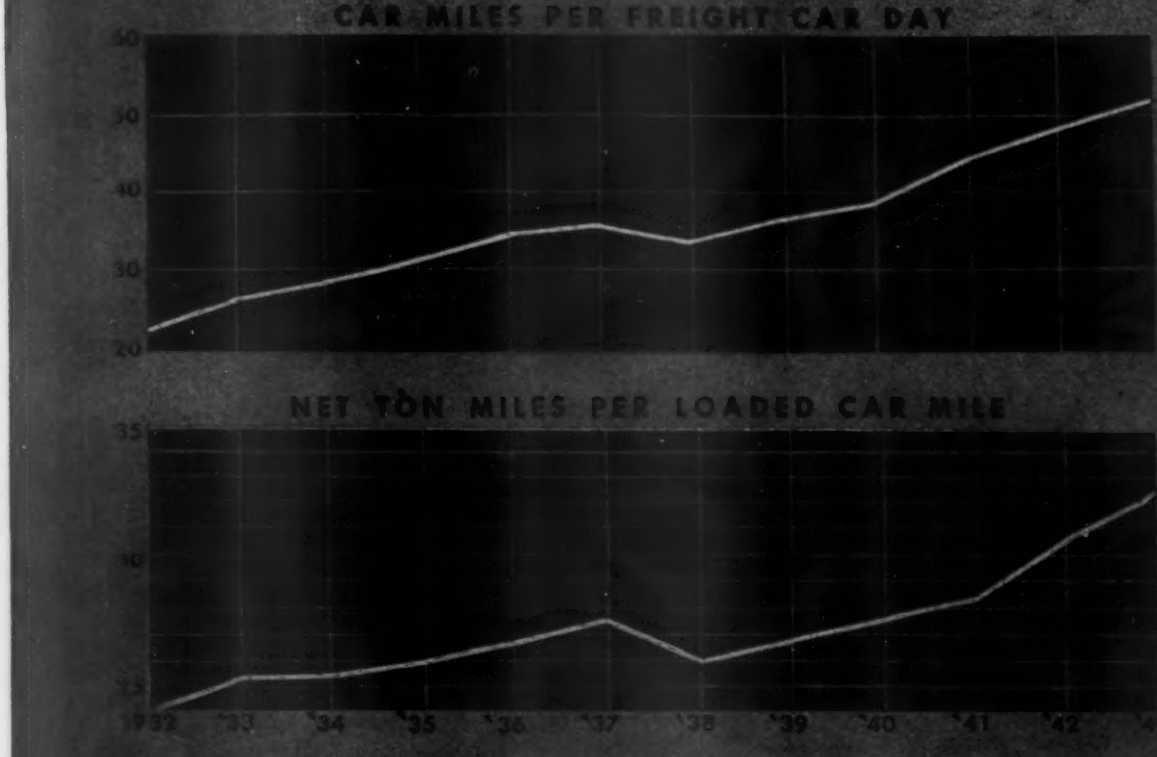
This experimental car was designed by Great Northern engineers with the cooperation of Alcoa engineers. Equipped for high speed, the car is now in service.

ALUMINUM COMPANY OF AMERICA, 1929 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

BETTER CAR PROTECTION PRODUCES RESULTS



As shown in the above diagram, both car mileage per freight car day and net ton miles per loaded car mile have been materially increased during the last twelve years, greatly increasing the shocks to which freight cars are subjected in switching and train movements.

Meantime, shortage of help has curtailed the scope of preventive maintenance. Yet the cost of freight car repairs per ton mile has been decreased over 10% since 1932—resulting from improvement in operating practices, freight car standards, and shock absorbing devices.

Over 98% of the cars in freight carrying service are A.A.R. construction, and over 96% have Friction Draft Gears.

Cardwell Westinghouse Draft Gears and Friction Bolster Springs meet the greater shock protection requirements of the accelerated and heavier traffic.

CARDWELL WESTINGHOUSE CO., CHICAGO
CANADIAN CARDWELL CO., LTD., MONTREAL

He was right, for years, when he said people talked about weather, but did nothing constructive about it. However, he's proved wrong today.

For our modern trains maintain delightful mountain-side temperatures, all the way across deserts. And our railway designers are working, successfully, now, to provide even finer, "*weather-proofed*" train-riding comfort and relaxation.

Significant, in their success, is the Dayton V-Belt Drive. For Dayton V-Belts deliver smooth-running, long-lived, trouble-free, power-transmission required for Modern Railway Equipment.

They are V-Belts engineered by Dayton's own Railway Division, and approved by Dayton's own precise technicians. They're strong, long-lasting, tough, hard-gripping; and far more weather and water resistant than any other V-Belts known.

Complete V-Belt engineering data is now available. It has been compiled during 40 years of Dayton's specialized experience in the processing of both natural and synthetic rubber. So consult with Dayton Rubber, your specialized manufacturer, on any present or future power-transmission problem . . . especially for air-conditioning, car-lighting, or Diesel locomotive operation. We will be glad to help you.

Dayton Two-inch "D-R" V-Belt Drive

THE DAYTON RUBBER MANUFACTURING CO.
DAYTON 1, OHIO

Pioneers of Railway V-Belts and Connectors—
The World's Largest Manufacturer of V-Belts

Specialized Manufacturer for the R. R. Industry

V-Belts by Dayton Rubber

The Mark of Technical Excellence in Synthetic Rubber

★ KEEP ON BUYING WAR BONDS ★

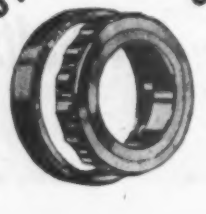
SHOULDER TO SHOULDER
for fifty-three years

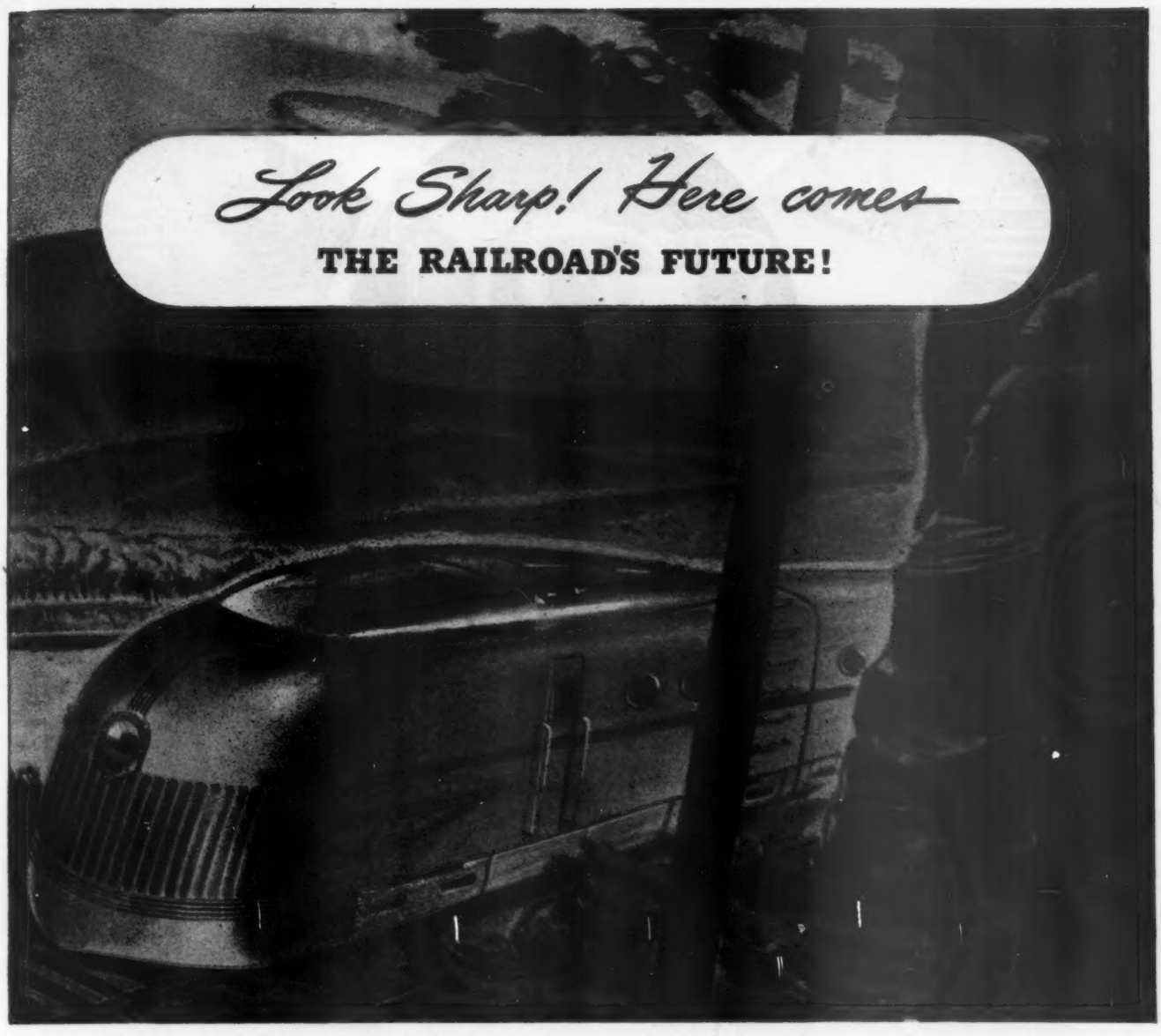
Shoulder to shoulder for over half a century, American Industry and Hyatt have worked together in the field of mechanical progress —solving ever and ever more complex engineering design problems and arriving at higher and higher precision and performance.

Today, we want to thank Industry for its generous understanding of Hyatt's wartime obligation of first serving our country. Also, we want to assure Industry that there will be compensations —for the Hyatt Roller Bearings of peacetime will reflect valuable lessons learned in the making of super-precision and super-serviceable Hyatt Roller Bearings for the tools and weapons of war.

So shoulder to shoulder, American Industry and Hyatt will continue to new heights of accomplishment. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey; Chicago; Detroit; Pittsburgh; Oakland, California.

DIVISION OF

HYATT BEARINGS  **GENERAL MOTORS**



MERITS OF ALLEGHENY METAL

- ★ Great strength, retained at extremes of heat and cold.
- ★ Tough and impact-resistant.
- ★ Favorable strength-weight ratio.
- ★ Highly corrosion-resistant.
- ★ Inherent, lasting beauty.
- ★ Easy to form and weld.

STAINLESS STEEL diesel-electric streamliners aren't drawing-board dreams. They're tangible, self-proved successes with a ten-year operating record from coast to coast—and from war's end on, they're due to go places in earnest.

Why? Because these stainless speedsters have demonstrated—in good black ink on the books—their ability to slash expenses, attract customers and boost income, and you can't beat that for a success formula.

It is a formula, what's more, that applies clear across the transportation field. The same qualities in Allegheny Metal that the railroads value are of equal advantage to the builders of buses, truck trailers, airplanes and ships. It all comes back to the tremendous strength of the steel—*insured* strength, protected by Allegheny Metal's high resistance to corrosion and complete uniformity . . . to its lustrous beauty, requiring no other finish or consequent refinishing . . . and to its ease of welding and fabricating.

Anywhere that these properties can be put to work, we stand ready to supply every assistance. Allegheny Ludlum Steel Corporation, Brackenridge, Pa.

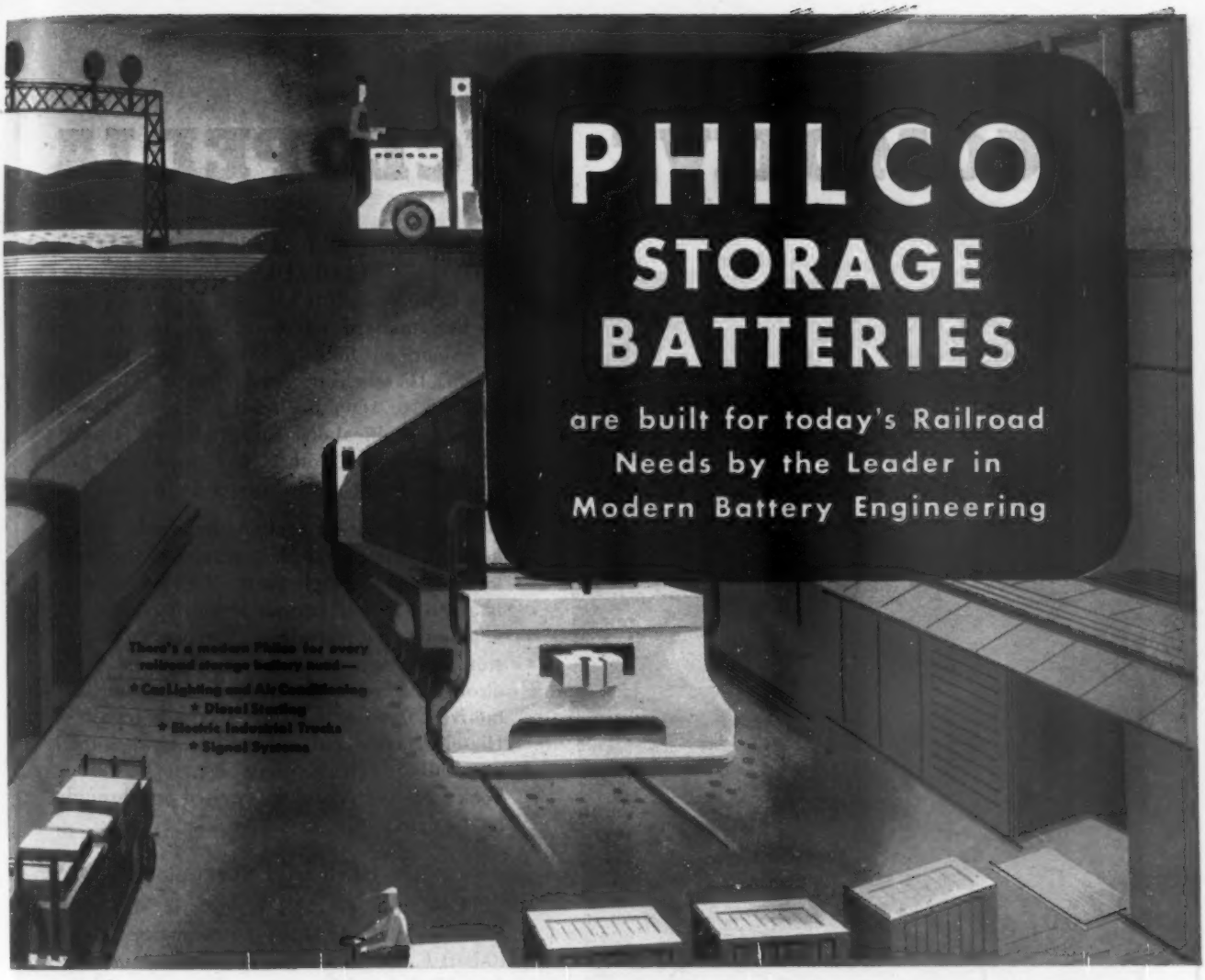
Allegheny Metal is also handled and stocked by all Joseph T. Ryerson & Son, Inc. warehouses

W&D...9462 B

ALLEGHENY METAL

The Time-Tested Stainless Steel

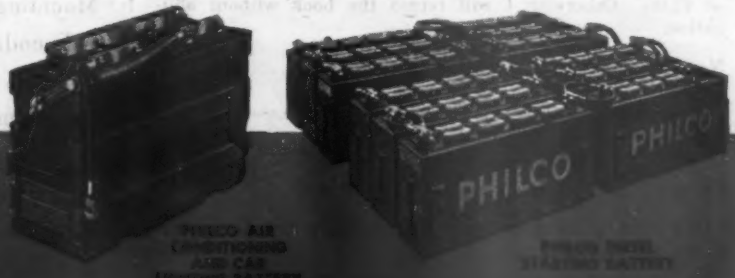
REMEMBER THE NAME TODAY FOR THE NEEDS OF TOMORROW



THE procession of Philco "Firsts", covering the whole field of motive power and stationary batteries, has set the pace in modern battery design. Check back over the developments which have contributed *most* to today's higher capacities, increased efficiency, longer life and over-all lower cost of storage battery power. The record shows *you get it first with Philco.*

NOW—ANOTHER PHILCO "FIRST"

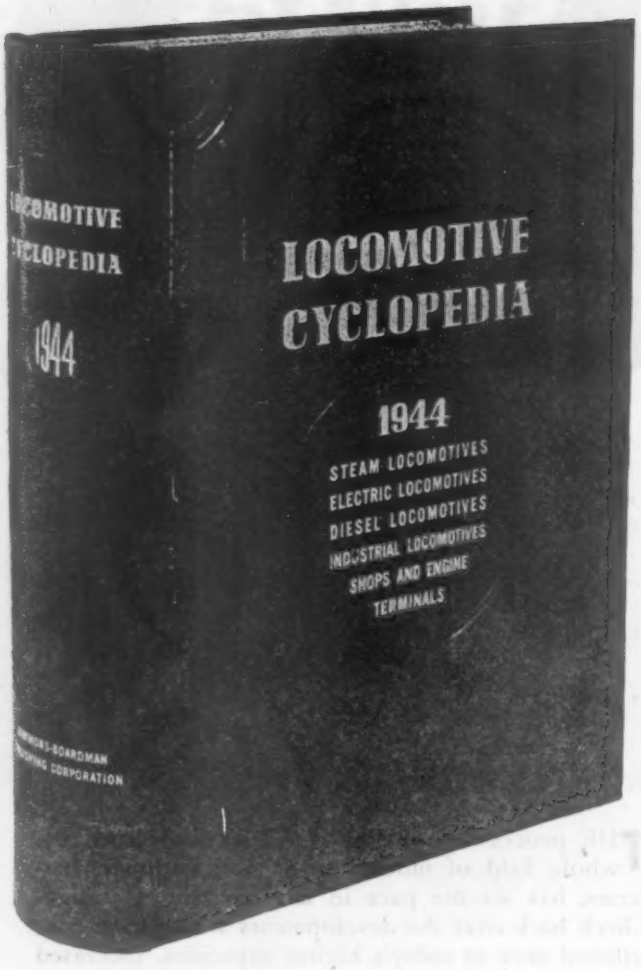
Newest of the long series of major storage battery developments pioneered by Philco, is the new Philco "Thirty", the revolutionary battery that gives 30% longer life. Here is the motive power battery for industry's toughest jobs, now and after the war. Write for information. Philco Corporation, Storage Battery Division, Trenton 7, New Jersey.



FOR 50 YEARS
A LEADER IN INDUSTRIAL
STORAGE BATTERY DEVELOPMENT

New Twelfth Edition

LOCOMOTIVE CYCLOPEDIA



1,396 pages, 3,000 illustrations, 13 pages in full color, 9x12x3½ inches, weight 9 pounds, Fabrikoid, $5.00

The Twelfth or 1944 edition of the LOCOMOTIVE CYCLOPEDIA is now ready. For nearly 40 years this book has been recognized as the standard reference book on all types of American built railway motive power—steam, Diesel-electric and electric. It is on the desk or reference shelf of railway executives, mechanical department officers, purchasing agents and other key men wherever American built motive power is in use.

The new edition contains hundreds of new detail drawings and photographs of the latest locomotives and their parts. Full information is given on their various types of equipment, appliances and materials. The big Shops Section has a new chapter on Layout and Operations of Shops for the repair of steam locomotives, three new chapters on the repair of Diesel-electrics and a complete new chapter on welding. The 90 other chapters in the big book have been carefully revised and brought up to date.

Staff of Experts

The editor, Roy V. Wright, is Managing Editor of *Railway Age*; the managing editor, Robert C. Augur, is Associate Editor of *Railway Mechanical Engineer*. The editor of the Shops Section is H. C. Wilcox of *Railway Mechanical Engineer*, who was assisted by specialists on various branches of shop work. An advisory committee of four eminent mechanical engineers of the Association of American Railroads, Mechanical Division, helped in the revision of important sections.

CONTENTS OF SECTIONS

Dictionary of Locomotive Terms—Steam Locomotives—Locomotive Boilers—Boilers; Water Supply—Boilers; Fuel Supply—Cabs; Fittings; Boiler Mountings—Engine; Cylinders and Driving Gear—Foundation and Running Gear—Lubrication—Couplers and Draft Gears—Brakes and Brake Gear—Locomotive Tenders—Safety Appliances—Electric Locomotives—Diesel Locomotives—Industrial Locomotives — Export Locomotives — Locomotive Materials—Locomotive Operation—Shops and Engine Terminals—Indexes.

FREE EXAMINATION COUPON

Simmons-Boardman Publishing Corporation
30 Church Street, New York 7, N. Y.

Please send me postpaid a copy of the new Twelfth Edition of the LOCOMOTIVE CYCLOPEDIA, on Ten Days' Free Examination. If satisfactory I will remit the list price of $5.00. Otherwise I will return the book without obligation.

Name .....

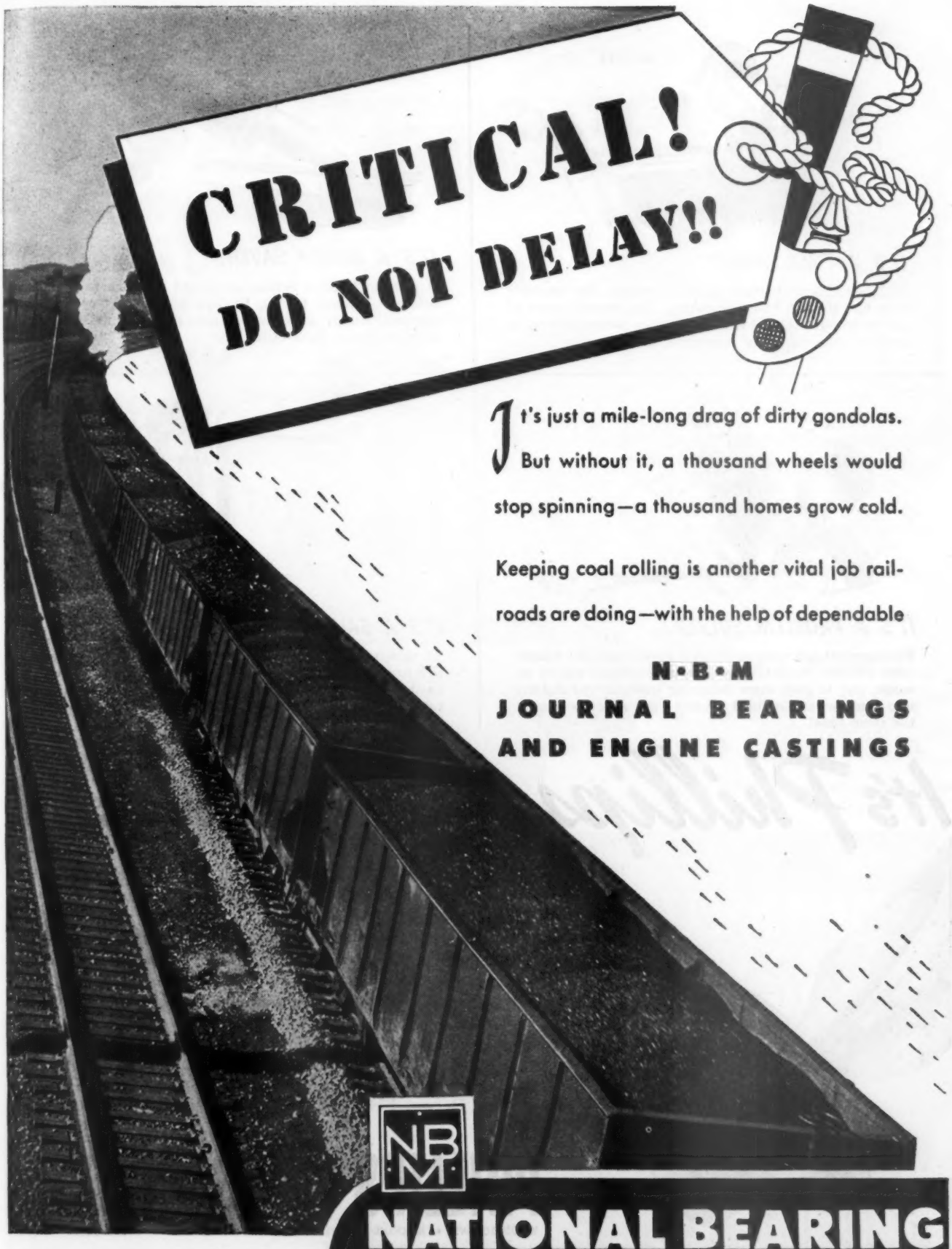
Address .....

City ..... State .....

Company ..... Position .....

(This offer is limited to retail purchasers in the United States and Canada.)

R. M. 1-45



It's just a mile-long drag of dirty gondolas. But without it, a thousand wheels would stop spinning—a thousand homes grow cold.

Keeping coal rolling is another vital job railroads are doing—with the help of dependable

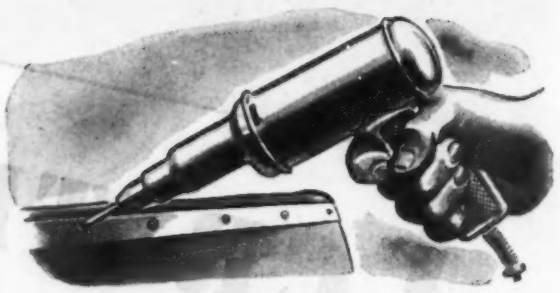
N • B • M
JOURNAL BEARINGS AND ENGINE CASTINGS

NBM
NATIONAL BEARING METALS CORPORATION
ST. LOUIS • NEW YORK

AMERICAN Brake Shoe COMPANY

IT'S A TIME SAVER!

So long as his plant stuck to slotted screws, this assembly man had to stick to hand driving. Too much danger of power drivers skidding and gouging the carriage's finished surface – making costly refinishing necessary.



IT'S A MONEY SAVER!

A shift to Phillips Screws permitted a switch to power driving. Thanks to the Phillips Recess, driver skids stopped. Result: a fast, money-saving process instead of a slow, high-cost hand operation!

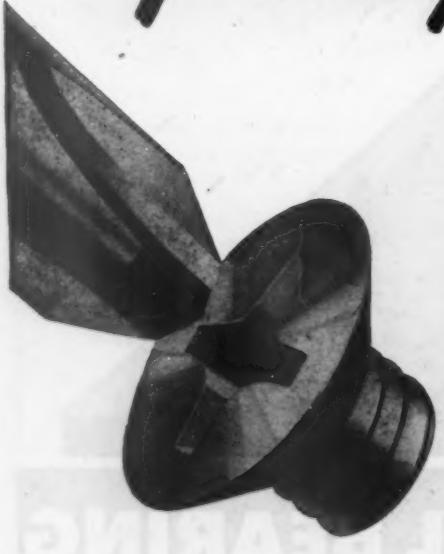
IT'S A PROBLEM SOLVER!

Management and workers aren't the only ones who benefit from Phillips Screws. Design Engineers find there's no easier way to plan extra fastening strength and rigidity into a modern streamlined product – and to lower costs at the same time!

IT'S A SALES BUILDER!

To salesmen, too, use of Phillips Screws pays dividends: in a stronger, smarter product . . . that has no burred screw heads to disfigure surfaces and snag clothing. Ornamentally as well as functionally, this recess is engineered to SELL your product!

It's Phillips — the engineered recess!



In the Phillips Recess, mechanical principles are so correctly applied that every angle, plane, and dimension contributes fully to screw-driving efficiency.

. . . It's the exact pitch of the angles that eliminates driver skids.

. . . It's the engineered design of the 16 planes that makes it easy to apply full turning power – without reaming.

. . . It's the "just-right" depth of recess that enables Phillips Screw Heads to take heaviest driving pressures.

With such precise engineering, is it any wonder that Phillips Screws speed driving as much as 50% – cut costs correspondingly?

To give workers a chance to do their best, give them faster, easier-driving Phillips Recessed Head Screws. Plan Phillips Screws into your product now.

PHILLIPS Recessed Head SCREWS

WOOD SCREWS • MACHINE SCREWS • SELF-TAPPING SCREWS • STOVE BOLTS

Made in all sizes, types and head styles

24 SOURCES

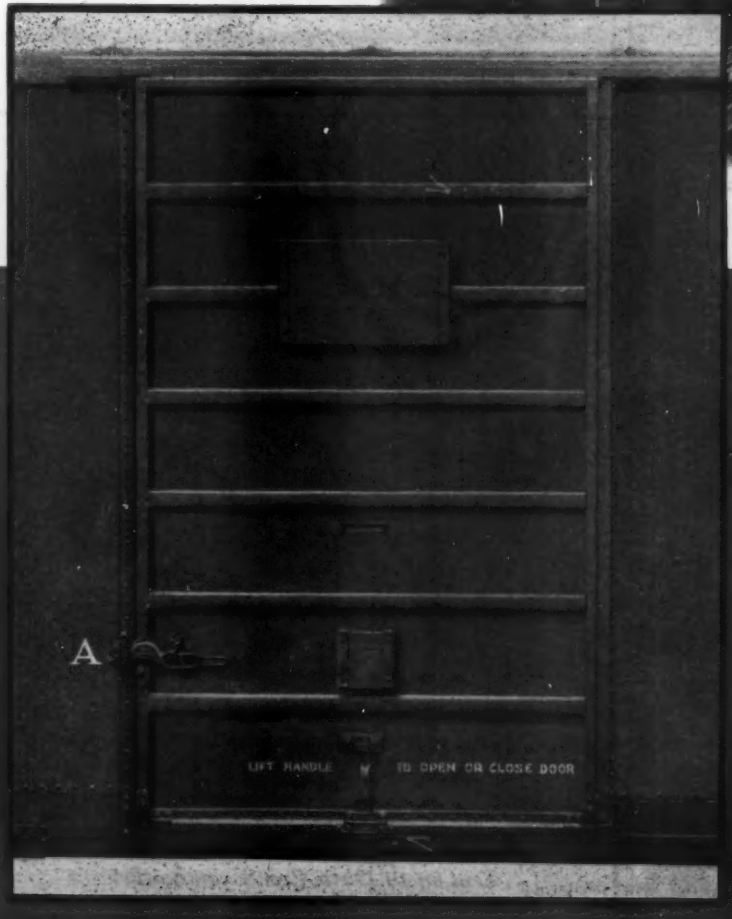
American Screw Co., Providence, R. I.
Atlantic Screw Works, Hartford, Conn.
The Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
General Screw Mfg. Co., Chicago, Ill.
The H. M. Harper Co., Chicago, Ill.
International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
Manufacturers Screw Products, Chicago, Ill.
Milford Rivet and Machine Co., Milford, Conn.
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Keene, N. H.
Parker-Kalon Corp., New York, N. Y.
Pawtucket Screw Co., Pawtucket, R. I.
Pheoll Manufacturing Co., Chicago, Ill.
Reading Screw Co., Norristown, Pa.
Russell Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Manufacturing Co., Waterville, Conn.
Shakeproof Inc., Chicago, Ill.
The Southington Hardware Mfg. Co., Southington, Conn.
Wolverine Bolt Co., Detroit, Mich.

This Baffle Construction is
WEATHERPROOF

It Keeps Out

RAIN
SNOW
DUST
CINDERS

...reduces damage claims



SUPERIOR
CAR DOORS

- RIGID CONSTRUCTION
- LIGHT WEIGHT
- LONG LIFE
- WEATHER PROOF
- FREE ROLLING
- NO SLAMMING

SUPERIOR CAR DOOR COMPANY

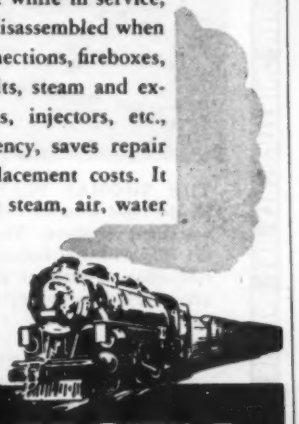
McCORMICK BUILDING · CHICAGO

IN LOCOMOTIVE CONSTRUCTION and MAINTENANCE

'BESTOLIFE

- INCREASES EQUIPMENT EFFICIENCY
- SAVES REPAIR TIME HOURS
- REDUCES NUMBER OF REPLACEMENT PARTS

'BESTOLIFE Lead Seal Joint Sealing and Anti-Seize Compound keeps locomotive joints sealed, and studs and stay bolts tight while in service, yet allows them to be easily disassembled when desired. Used with boiler connections, fireboxes, smokeboxes, super-heater units, steam and exhaust piping, valves, pumps, injectors, etc., 'BESTOLIFE increases efficiency, saves repair time hours and reduces replacement costs. It provides leak-proof joints on steam, air, water and oil lines. Applied easily with a brush and does not deteriorate.



Manufactured Exclusively by

I. H. GRANCELL

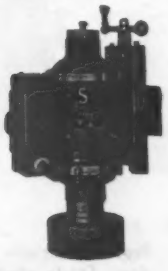
1601 EAST NADEAU STREET
LOS ANGELES 1, CALIFORNIA

STANDARD GRINDERS—all kinds!

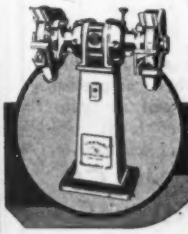
Snagging
Tool
Carbide
Disc
Tool Post—Angle Plate
Vertical Spindle

Type 5HPGA Heavy Duty Pedestal Grinder illustrated. 5 H.P. 1200 R.P.M. motor for 18"x3"-x1½" Wheels. Used by most Railroads for heavy duty snagging, blacksmith work, tool sharpening, etc. 12", 14" and 20" are also popular.
Sizes: 6" to 30" wheels.

Tool Post Grinders with interchangeable quills for internal-external grinding, ¼ H.P. to 10 H.P.



VERTICAL SPINDLE GRINDERS
For Planer, Boring Mill, etc. Without feed, or with horizontal-vertical feeds. ⅓ H.P. to 15 H.P. 3600, 1800, or 1200 R.P.M.



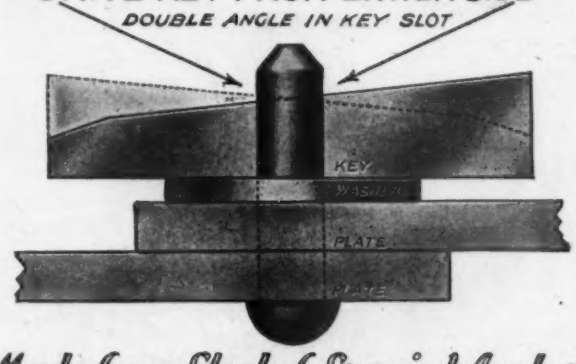
Write for Complete Catalog

The STANDARD ELECTRICAL TOOL Co.

CINCINNATI · 4 · OHIO
2519 Mt. Hope & River Road

-New Process-
KEY BOLTS
FOR "FITTING-UP" PURPOSES
No Instructions Needed

DRIVE KEY FROM EITHER SIDE



Made from Steel of Special Analysis
— Hold Tighter —
— Last Longer —
— Cost Less —

McKAIG-HATCH INC.
MANUFACTURER
BUFFALO 7, N. Y.—U. S. A.

Lighter weight and smart appearance of the Protecto-Shield makes it popular to wear. Quickly adjustable head band gives a perfect fit over a hair-do or a man's head.

Ask your Willson Safety Equipment Distributor for further information on the Protecto-Shield for light grinding, woodworking and spot welding. Or write for descriptive bulletin.

GOGGLES • RESPIRATORS • GAS MASKS • HELMETS

DOUBLE WILLSON

PRODUCTS INCORPORATED
READING, PA., U.S.A. *Established 1870*

GET TOGETHER DEPARTMENT

FOR SALE

POSITIONS OPEN

HIGH-CALIBRE MEN WANTED

A leading manufacturer of electrical equipment, in business more than a quarter of a century, has several openings in key positions for high-calibre men of the following qualifications: experience in the sale of industrial, railroad and mine-haulage equipment; background of education in electrical engineering; 27 to 35 years of age; potential executive ability.

If you measure up to these requirements, are ambitious, and are looking forward to postwar security and advancement, a letter giving details of your qualifications and experience will be of mutual interest and advantage. All replies confidential. ADDRESS BOX 522, RAILWAY MECHANICAL ENGINEER, 30 CHURCH STREET, NEW YORK, 7, N. Y.

CHIEF ENGINEER
and
TWO DRAFTSMEN
Freight Car Division

Men familiar with the design of freight cars, parts and equipment. Attractive positions with large freight car manufacturer in the middle west. Replies held in confidence. ADDRESS BOX NO. 523, RAILWAY MECHANICAL ENGINEER, 30 CHURCH STREET, NEW YORK, 7, N. Y.

INDEX TO ADVERTISERS
JANUARY, 1945

A

Adams & Westlake Company 112
Aeronautical Products, Inc. 35
Aircraft & Diesel Equipment Corporation 139
Aircraft Standard Parts Co. 145
Air Reduction Sales Co. 36
Ajax Manufacturing Company, The 41
Allegheny Ludlum Steel Corporation 123
Aluminum Company of America 119
American Arch Company, Inc. 66
American Locomotive Company 10, 11, 70, 71, 84, 85
American Railway Products Co. 144
American Smelting & Refining Company 48
American Steel Foundries 117
American Tool Works Company, The 24, 25
Anderson Mfg. Co., Albert & J. M. 147
Armstrong-Blum Mfg. Co. 34
Armstrong Bros. Tool Company 145
Association of Manufacturers of Chilled Car Wheels 63

B

Babcock & Wilcox Tube Company, The 79
Baldwin Locomotive Works, The 4, 5
Barber-Coleman Company 113
Barco Manufacturing Co., Not Inc. 80
Beatty Machine & Mfg. Co. 130
Bridgeport Safety Emery Wheel Co., The 50
Broderick & Bascom Rope Co. 6
Buda Co., The 51
Buffalo Forge Co. 118
Bullard Company, The 31
Byers Company, A. M. 62

C

Canadian Cardwell Co., Ltd. 120
Carboloy Company, Inc. 21
Cardwell Westinghouse Co. 120
Chambersburg Engineering Co. 44
Champion Rivet Company 30
Cherry Rivet Company 26
Cincinnati Planer Co., The 52
Cincinnati Shaper Co., The 33
Clark Company, Robert H. 53
Classified Advertisements 132
Climax Molybdenum Company 100
Coffin, Jr., Company, The J. S. 77
Columbia Steel Company 96
Consolidated Machine Tool Corporation 27
Crane Company 56
Cullen-Friestedt Co. 131

D

Dampney Company of America, The 103
Dayton Rubber Mfg. Company, The 121
Diamond Machine Company 42
Drop Forging Association 17

E

Edison Storage Battery Div. of Thomas A. Edison, Inc. 116
Editor's Desk 58
Edna Brass Mfg. Co. 137
Electric Storage Battery Company, The 108
Electro-Motive Division, General Motors Corporation 68, 69
Eutectic Welding Alloys Company 45
Ex-Cell-O Corporation 131

F

Fairbanks, Morse & Co. 101
Federated Metal Div., American Smelting & Refining Co. 48
Firth-Sterling Steel Company 23
Flannery Bolt Company 94
Flexible Steel Lacing Co. 145
Flexo Supply Company, Inc. 145
Franklin Railway Supply Company, Inc. 65

G

General Electric Co. 10, 11, 84, 85
General Steel Castings 74, 75
Get Together Dept. 144
Gisholt Machine Company 37
Giddings & Lewis Machine Tool Co. 14, 15
Gould Storage Battery Corporation 111
Grancell, I. H. 141
Grip Nut Company 107

H

Hall Manufacturing Co., The 136
Hennessy Lubricator Co., Inc., ... 81
Hevi-Duty Electric Company 12
Holland Company 114
Houde Engineering Co. 109
Hyatt Bearings Division of General Motors 122

I

Independent Pneumatic Tool Company 40
Ingersoll-Rand 43
International Nickel Company, Inc., The 76
Iron & Steel Products, Inc. 144
Irvington Varnish & Insulator Company 132

J

Johnston Manufacturing Company 132
Jones & Lamson Machine Co. 16
Jones & Laughlin Steel Corporation 32
Jones Motrola Company 143
Justrite Manufacturing Company 143, 144

K

Keybolt Appliance Division, Hardinge Brothers, Inc. 140
King Machine Tool Company, The 59

L

Landis Machine Company 20
LeBlond Machine Tool Co., The R. K. .....Back Cover
Lima Locomotive Works, Incorporated 64
Lodge & Shipley Machine Tool Co., The 54
Lucas Machine Tool Co. 22
Lufkin Rule Co. 135
Lunkenheimer Co., The 55

M

MacLean-Fogg Lock Nut Company 7
Mahr Manufacturing Co., Div. of Diamond Iron Works, Inc. 143
Manganese Steel Forge Company 39
Manheim Manufacturing & Belting Co. 133
Marchant Co., Geo. F. 140
Marquette Metal Products Co., The 83
McGill Manufacturing Co., Inc. 138
McKaig-Hatch, Inc. 141
McQuade Company, R. J. 133
Miner, Inc., W. H. 78
Motor Wheel Corporation 136

N

National Bearing Metals Corporation 127
National Malleable and Steel Castings Co. 124
National Tube Company 96
Nelson Specialty Welding Equipment Co. 19

O

Oakite Products, Inc. 3
Okadee Company, The 135
Oster Manufacturing Company, The 57

P

Parker-Kalon Corporation 46
Peerless Machine Company 134
Philco Corporation, Storage Battery Division 125
Phillips Screw Manufacturers 128
Pilliod Company, The 138
Post-Glover Electric Company 98
Prime Manufacturing Co., The 97

R

Racine Tool & Machine Co. 138
Republic Steel Corporation 91, 99
Ridge Tool Company, The 139
Rockford Machine Tool Co. 8
Ryerson & Son, Inc., Joseph T. 9

S

Safety Car Heating and Light Company, Inc., The 110
Sciaky Bros. 49
Simmons-Boardman Publishing Corp. 126
Simmons Machine Tool Corporation 38
Sinclair Refining Company 90
Skilsaw, Inc. 140
Smooth-on Mfg. Co. 143
Socony-Vacuum Oil Co., Inc. 86, 87
Spicer Manufacturing Corporation 115
Standard Car Truck Company 102
Standard Electrical Tool Co., The 141
Standard Oil Company of California 95
Stanley Electric Tool, Division of The Stanley Works 137
Superheater Company, The 67
Superior Car Door Company 129
Superior Railway Products Corp. 92

T

Thomas Machine & Mfg. Company 142
Timken Roller Bearing Company, The 93
Tinnerman Products, Inc. 106, 142
T-Z Railway Equipment Co., Inc. 136

U

Underwood Corp., H. B. 142
Union Asbestos and Rubber Co. 88, 89
Union Switch & Signal Company 72, 73
Unit Truck Corporation 2
U. S. Metallic Packing Co., The 142
United States Steel Co. 96
United States Steel Export Co. 96

W

Walworth Company 18
Warner & Swasey Co. 47
Watson-Stillman Co., The 13
Wells Manufacturing Corporation 134
Westinghouse Air Brake Co. 60
Westinghouse Electric & Mfg. Co. 4, 5, 104, 105
Whiting Corporation 28
Williams & Co., J. H. 29
Willson Products, Incorporated 141
Wine Railway Appliance Co., The .....Front Cover

ANDERSON Eitherend

WELDING CABLE CONNECTORS

For convenience in electric welding, Anderson Eitherend cable connectors provide a simple means for coupling together lengths of single conductor cable. Neither male nor female, just insert one connector within the other and the juncture is complete. The ends are exactly alike and no mistake can be made. Eitherend cable connectors have no bolts or other loose parts that take time to adjust.

Thousands in daily use all over the country. Made in cable sizes from No. 6 to No. 0000. Soldered or solderless connection.

TYPE CC Receptacle. The Standard passenger car charging receptacle for many years.

ARMY E NAVY

ALBERT and J.M. ANDERSON MFG. CO.

289-305 A Street, Boston 10, Mass.

NEW YORK CHICAGO PHILADELPHIA LONDON

"SCRAP METAL JOE, I WAS CALLED IN THOSE DAYS"

"I turned out too darned much scrap. No matter how careful I was and how hard I tried, the scrap kept piling up. I lost faith in my skill—began to figure I was a lousy lathe operator and would never improve.

"Then one day they put me to operating a brand new LeBlond lathe. It seemed like a miracle was happening to me. The stuff I turned out was right on the beam. My scrap was way below the percentage estimated for the job. I was happy as a lark.

"I've been at that new LeBlond ever since, turning out swell stuff day in and day out. They don't call me Scrap Metal Joe anymore. No sir! It's Wizard Joe now. What made the difference? The new LeBlond lathe! That old junker I'd been running before never could be kept in proper adjustment for long—that's why all the scrap. This new LeBlond is a Lulu—when she's set, she's SET, and she turns the stuff out better and faster. Yep! You've got to have a good lathe if you want to turn out good work, less scrap."

LeBlond is building tomorrow's lathes today. They'll help you turn Scrap Metal Joes into Wizards. They'll help you meet tomorrow's greater, keener competition with confidence. Write for catalog

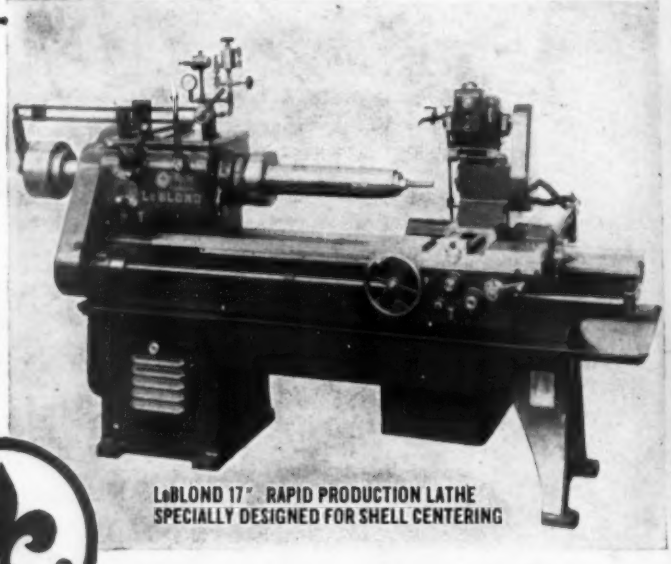
• TO HELP YOU . . .

We have been building lathes since 1887.

Today LeBlond Lathes are used on turning operations the world over. The accumulated knowledge of every manufacturing trend in good times and bad . . . peace and war, gained from thousands of installations is now available to you.

Our field engineers are at your service . . . ready to help you in your development work for the postwar era—particularly along the lines of the difficult, out-of-the ordinary turning problems.

This service is yours for the asking. Contact our nearest dealer or write—Department FE 46.



LeBLOND 17" RAPID PRODUCTION LATHE
SPECIALLY DESIGNED FOR SHELL CENTERING

ARMY E NAVY ★ YOUR BONDS BUY BOMBS ★ BUY A "BLOCK-BUSTER" TODAY! 10 1

THE R. K. **Le BLOND** MACHINE TOOL CO., CINCINNATI 8, OHIO, U. S. A.

NEW YORK 13, 103 Lafayette St., CAnal 6-5281

CHICAGO 6, 20 N. Wacker Dr., STA 5561

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES